

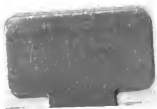


1907



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1831C2.

$$N \quad O \quad \mathbb{R}$$

Reference to Soils &c.

P. Mostly dry, intermixed with Clayey and Moist Loam.
 Q. Clayey Loam.
 R. Fertile Strong Clayey Loam.
 S. Poor unferile Clay.
 T. Dry Loam on Magnesian Limestone.
 V. Moist Loam on Clay.
 W. Mostly dry, intermixed with Clayey and Moist Loam.
 X. Moist Soft Loam on Ochery Clay, the Western Parts Peaty.
 Y. Peaty, covered with Heath.

• Denotes Coal mine.

D^c D^e *Dykes*.

No other than Turnpike Roads
are inserted.

PLANTING

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GENERAL VIEW
OF THE
AGRICULTURE
OF THE
COUNTY OF DURHAM,
WITH
OBSERVATIONS

The Means of its Improvement.

DRAWN UP FOR
THE CONSIDERATION

OF THE

BOARD OF AGRICULTURE AND INTERNAL
IMPROVEMENT.

BY JOHN BAILEY.



Nor you, ye rural patriots ! disdain
To plant the grove ; to turn the fertile mould ;
Or tend the bleating flocks For hence
Britannia sees her solid grandeur rise ;
..... Hence she commands
The exalted stores of every brighter clime :
..... Her dreadful thunder hence
Rides o'er the waves sublime ;—rules the circling deep ;
And awes the world.

PRINTED FOR RICHARD PHILLIPS, BRIDGE-STREET, LONDON ;
(BY E. WALKER, NEWCASTLE UPON TYNE.)

SOLD BY L. PENNINGTON, DURHAM ; CHRISTOPHER AND
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J. GRAHAM, SUNDERLAND ; AKENHEADS AND
CHARNLEYS, NEWCASTLE, AND ALL
OTHER BOOKSELLERS.

1810.

23/1/12

P R E F A C E.

IN the year 1796, at the request of Sir John Sinclair, the then President of the Board of Agriculture, I traversed the county of Durham in various directions, for the purpose of drawing up a General View of its Agriculture; but a certain gentleman interfered, and wished the business might be put into better hands, which I readily acquiesced in, and was happy in being released from the trouble: but it seems the person or persons intended for the work, relinquished it: as Sir John, upon his re-election to the Presidency, in 1807, once more solicited me to resume the business. Nothing but the high regard I entertained for so worthy and patriotic a cha-

racter, could have induced me to engage a second time in so troublesome an undertaking, when my other avocations allowed me so little leisure to dedicate to it: but I hope an intimate acquaintance, (of upwards of forty years), with the agriculture of the county, and several excursions through various parts of it, in the years 1807, 1808, and 1809, for the purpose of collecting materials, in addition to those I had previously obtained, have enabled me to give a correct General View of the State of the County of Durham, at the periods above-mentioned.

J. B.

Chillingham, 1810.

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The Reader is desired to correct with his pen, the following

ERRATA.

PAGE. LINE.

- | | | |
|------|-----------|--|
| 80, | 18 | <i>For fig. 3, read fig. 5.</i> |
| 87, | 8 | <i>For average, read acreage.</i> |
| 114, | 5 | <i>For 3 inches, read 6 inches.</i> |
| 123, | 18 | <i>For years, read ears.</i> |
| 161, | last line | <i>For page 110, read page 386.</i> |
| 177, | 1 | <i>After winter, add with sheep.</i> |
| 190, | 12 | <i>For Painshaw, read Penshaw.</i> |
| 229, | 1 | <i>After year add 1779.</i> |
| 233, | 28 | <i>For Middleton in Teesdale, read Stanhope in Weardale.</i> |
| 279, | | <i>At the bottom, add the 22nd November, and second Monday after, for cattle, sheep, &c.</i> |
| 281, | 6 | <i>After the, add third Monday in December.</i> |
| 372, | 12, | <i>For Dreerood, read Dree-road.</i> |

AGRICULTURAL SURVEY OF THE COUNTY OF DURHAM.

CHAP. I.

GEOGRAPHICAL STATE AND CIRCUMSTANCES.

SECT. I.—SITUATION AND EXTENT.

THE form of the county of Durham is nearly that of an equilateral triangle: the length, from its southern extremity at Sockburn, to the mouth of the Tyne, being nearly equal to the distance of these two points, from its western extremity, adjoining the counties of Cumberland and Westmoreland. It is situated between the latitudes of $54^{\circ}.29'$ and $55^{\circ}.03'$, and bounded on the east, by the German Ocean; on the west, by Cumberland and Westmoreland; on the north, by the county of Northumberland; and on the south, by Yorkshire, and contains about 582,400 acres, according to Armstrong's map, made in 1768, which is probably the best, yet it is very defective and incorrect. An accurate map of the county, from a correct and actual survey, is much wanted.

SECT. II.—DIVISIONS.

1st. Political.

THE county of Durham is divided into four wards, viz :—Darlington ward, Chester ward, Easington ward, and Stockton ward. The number of acres in each ward are nearly as follows :

Darlington	275,200	acres, of which	116,480	are heath.
Chester	89,600	ditto	27,520	ditto.
Easington	75,520			
Stockton	142,080			

In all	<u>582,400</u>	of which	<u>144,000</u>	are heath.
--------	----------------	----------	----------------	------------

2nd. Ecclesiastical.

The archdeaconry of Durham comprehends the four deaneries of Easington, Chester, Darlington, and Stockton; and the parishes, &c. within the jurisdiction of the archdeacon, are

Easington Deanery.

PARISHES.	RECTORY, VICAR-AGE, &c.	INCUMBENTS IN 1809.	PATRONS.
Easington	Rectory, annexed to the archdeaconry of Durham	Rd. Prosser, D. D. archdeacon of Durham	Bishop of Durham
St Nicholas, Durham	Curacy	E. Davison, A. M.	Sir H. V. Tempest, Bart.
St Mary-le-Bow, ditto	Rectory	W.N.Darnell, B.D.	Archdeacon of Northumberland
St Mary the Less, ditto	Rectory	Dickens Hazlewood, A. M.	The King
St Giles	Curacy	Jos. Watkins, A.M.	Sir H. V. Tempest.
Houghton-le-Spring	Rectory	E. S. Thurlow	Bishop of Durham
Painshaw	Curacy, within Houghton	T. Bowlby, A. M.	Rector of Houghton
Bishopwearmouth	Rectory	Robt. Gray, D. D.	Bishop of Durham
Sunderland	Ditto	J. Hampson, A.M.	Ditto
St John's chapel, ditto	Curacy	Ditto	Ditto
Seaham	Vicarage	R. Wallis, A. M.	Rev. R. Wallis and his wife
Castle Eden	Curacy	R. H. Branding, A. M.	R. Burdon, Esq.
Kelloe	Vicarage	Geo. Stephenson, A. M.	Bishop of Durham
Trimdon	Curacy	E. Davison, A. M.	W. Beckwith, Esq.

Chester Deanery.

Chester-le-Street	Curacy	W. Nesfield, A.M.	Sir R. Milbanke, Bart. and Hylton Jolliffe, Esq.
Tanfield	Do. in the parish of Chester	Caleb Dixon	Sir T. Liddell, Bart.
Lamesley	Ditto	Ditto	Ditto
Washington	Rectory	C. Egerton, A. M.	Bishop of Durham
Boldon	Ditto	J. Brewster, A.M.	Ditto
Whitburne	Ditto	J. Symons, B. D.	Ditto
Gateshead	Ditto	H. Phillpotts, A.M.	Ditto
Whickham	Ditto	J. Greville, L. L. B.	Ditto
Ryton	Ditto	C. Thorp, A. M.	Ditto
Hunstonworth	Curacy	Hudson Barnet	John Orde, Esq.
Ebchester	Ditto	W. Ellison, A. M.	Master & Brethren of Sherburn Hospital
Medomsley Chapelry	Ditto	Ditto	
Lanchester	Ditto	Joseph Thompson	Bishop of Durham
Esh Chapelry	Ditto	Edw. Marshall	Curate of Lanchester
Satley	Ditto	Ditto	Ditto

Darlington Deanery.

PARISHES.	RECTORY, VICAR- AGE, &c.	INCUMBENTS IN 1809.	PATRONS.
St Andrew, Auck- land	Curacy	John Bacon	Bishop of Durham
St Ann's chapel, in Bishop Auck- land	} <i>In the parish of Saint Andrew's Auckland.</i>	Ditto	Ditto
Escomb		Ditto	Ditto
St Helen's, Auck- land		Ditto	Ditto
Hamsterley		Ditto	Ditto
Witton-le-Wear		Ditto	Ditto
Wolsingham	Rectory	W. Wilson, A. M.	Bishop of Durham
Stanhope	Ditto	H. Hardinge, L.L.B.	Ditto
St John's Chapel, in Weardale	Curacy	John Clarke	Rector of Stan- hope
Middleton, in Teesdale	Rectory	C. Baillie, A. M.	The King
Eggleston Chapel	Curacy	Wm Marks	The Rector of Middleton
Gainford	Vicarage	J. Cranké, B. D.	Trinity College, Cambridge
Barnardcastle	} <i>In par. of Gainford.</i>	Curacy	J. S. Hale, A. M.
Whorleton		Ditto	Richard Wilson
Denton		Ditto	Thomas Peacock
Coniscliff	Vicarage	H. Richardson	Bishop of Durham
Winston	Rectory	F. Mundy, A. M.	Ditto
Staindrop	Vicarage	J. Thornhill, A. M.	Earl of Darlington
Cockfield	Rectory	Ditto	Ditto
Haughton, with Sadberge Chapel	Rectory	Hon. R. Byron, A. M.	Bishop of Durham
Darlington	Curacy	Wm Gordon	Earl of Darlington
Branspeth	Rectory	W. Nesfield, A. M.	R. E. D. Shafto, Esq.
Craike	Rectory	P. C. Guise, A. M.	Bishop of Durham

Stockton Deanery.

Hart	Vicarage	R. Ridley, A. M.	The King
Hartlepool Cha- pelry	Curacy	N. Hollingsworth, A. M.	The Vicar of Hart
Stranton	Vicarage	J. Becket, A. M.	Sir M. W. Ridley, Bart.
Elwick	Rectory	R. Richardson, A. M.	Bishop of Durham
Greatham	Vicarage	J. Brewster, A. M.	Master & Brethren of Greatham Hos- pital

Stockton Deanery, continued.

PARISHES.	RECTORY, VICARAGE, &c.	INCUMBENTS IN 1809.	PATRONS.
Norton	Vicarage	C. Anstey, A. M.	Bishop of Durham
Stockton	Ditto	T. Baker, A. B.	Ditto
Elton	Rectory	T. Ewbank, A.M.	G. Sutton, John Hogg, and Tho. Wade
Grindon	Vicarage	Jos. Middleton	Master of Sherburn Hospital
Egglescliffe	Rectory	G. Sayer, A. M.	Bishop of Durham
Middleton Saint George	Ditto	W. A. Fountain, A. M.	Miss Pemberton
Sockburn	Vicarage	Chas. Cooper	Master of Sherburn Hospital
Hurworth	Rectory	J. Theakson, A.M.	R. H. Williamson, Esq. & — John, son, Esq. alternately
Long Newton	Ditto	C. Plumptree, A.M.	Bishop of Durham
Bishopton	Vicarage	R. Tatham, A. B.	Master of Sherburn Hospital
Redmarshall	Rectory	G. S. Faber, B. D.	Bishop of Durham
Sedgefield, with Embleton Chapel	Ditto	Geo. Barrington, A. M.	Ditto
Stainton-le-Street	Ditto	T. Baker, A. B.	The King
Bp Middleham	Vicarage	H. Philpot, A. M.	Ditto

The Dean and Chapter of Durham exercise by their official archidiaconal jurisdiction, over the following churches in the county and diocese of Durham :—

Easington Deanery.

Pittington	Vicarage	James Deason	Dean & Chapter of Durham
Dalton-le-Dale	Ditto	James Fothergill, A. M.	Ditto
Monkheseldon	Ditto	Wm Flays, A. B.	Ditto
Croxdale	Curacy	S. Viner, A. M.	Ditto

Chester Deanery.

PARISHES.	RECTORY, VICAR-AGE, &c.	INCUMBENTS IN 1809.	PATRONS.
St Oswald's, in Durham	Vicarage	T. Hayes, A. M.	Dean & Chapter of Durham
St Margaret, do.	Curacy	Wm. Baverstock, A. B.	Ditto
Witton Gilbert, & Kimblesworth	Ditto	Rd. Richardson, A. M.	Ditto
Monkwearmouth	Ditto	John Hesket	Sir H. Williamson, Bart.
St Hild's, South Shields	Ditto	R. Wallis, A. M.	Dean & Chapter of Durham
Jarrow	Ditto	John Hodgson	C. Ellison, Esq.
Heworth	Ditto	Ditto	Ditto
Edmondbyers	Vicarage	James Deason	Dean & Chapter of Durham
Muggleswick	Curacy	Ditto	Ditto

Darlington Deanery.

Aycliffe, or Ayklea	Vicarage	D. Hazlewood, A. M.	Ditto
Heighington	Ditto	S. Viner, A. M.	Ditto
Merrington	Ditto	Vacant	Ditto
Whitworth	Curacy	T. Deason, A. B.	Ditto

Stockton Deanery.

Billingham	Vicarage	John Clark	Ditto
Wolveston	Curacy	G. B. Jackson, A. M.	Ditto
Dinsdale	Rectory	W. Addison, A. M.	Ditto

Newcastle Deanery.

Wall's End	Curacy	Robt. Blacket	Ditto
------------	--------	---------------	-------

Corbridge Deanery.

Bywell St Peter	Vicarage	Henry Johnson	Ditto
Whittonstall	Curacy	Mich. Maughan	Ditto

Morpeth Deanery.

Bedlington	Vicarage	Hen. Cotes, A. M.	Ditto
Meldon	Rectory	Richard Wilton	Ditto

Alnwick Deanery.

PARISHES.	RECTORY, VICAR- AGE, &c.	INCUMBENTS IN 1809.	PATRONS.
Ellingham	Vicarage	C. Perrigal, A. M.	Dean & Chapter of Durham
Edlingham	Ditto	J. Manisty, B. D.	

Bamburgh Deanery.

Berwick	Vicarage	Joseph Barnes	Ditto
Norham	Ditto	Joseph Watkins	Ditto
Holy Island	Curacy	Lancelot Wilson	Ditto
Tweedmouth, & Ancroft	Ditto	Andrew Bowlt	Ditto
Lowick, & Kyles	Ditto	J. Stopford, A. M.	Ditto
Cornhill	Ditto	D. Haggit, A. M.	Ditto
Branxton	Vicarage }		

SECT. III.—CLIMATE.

IN a district extending from the sea coast to near the top of Cross Fell, the highest land in England, being 3,400 feet above the level of the sea; and as the rise is pretty regular from the coast to the western mountains, the climate must vary considerably. When the weather is fine and mild in the lower districts, snow is frequently seen upon the mountains in November, and may be found upon them until the middle or latter end of June. As the cultivated grounds approach the mountains, the corn becomes later in ripening, until its ripening at all becomes very uncertain: and here its cultivation is of course not attempted.

In some years, and in early situations, the harvest begins the second week in August; but the most general time of harvest is, from the beginning of September to

the middle of October ; and very often in the western parts of the county, to the middle of November.

The prevailing winds in winter and spring, are from the northern and eastern quarters. The greatest droughts are mostly attended with a cold north-easterly wind ; provincially a "*sea pine*," which often begins in the month of March, and continues the most prevailing wind through April, May, and June ; from thence through the summer and autumn, the most prevalent winds, attended with frequent rain, are from the south and western quarters : the greatest falls of rain and snow are from the south east.

SECT. IV.—SOIL.

THE soils of this county vary in such insensible degrees, that it would be difficult to describe them in all their varieties. The principal distinctions, or heads of classification, may be taken as clay, loam, and peat.

The south east part of the county, from the Tees mouth to a few miles west of Stockton, and from thence by Redmarshal, Wolviston, Elwick, and as far north as Hart, consists of a strong fertile clayey loam, which produces good crops of wheat, beans, clover, and rich old grazing pastures.

To the westward of this, as far as Sedgely, Trimdon, and Eppleton ; and northward to near Sunderland, the soil is principally a poor, stubborn, unfertile clay, which produces miserable crops of corn ; and when suffered to remain in grass, produces a herbage, that scarcely any kind of stock will eat, unless compelled by hunger.

A clayey soil of an intermediate quality between these two, is found in various parts of the county, but scattered so promiscuously, and in such numberless situations, as makes it nearly impossible to give them a specific locality.

Of the loamy soils, there are also different varieties. The deep mellow tenacious dry fertile loams are in general found in the vicinity of rivers, as in the Vales of Tees, Skern, Tyne, and their tributary branches. Those on the river Wear are of a more friable and sandy texture; and dry fertile loams are found in many parts of the county in small patches, as at Staindrop, West Auckland, Sedgefield, &c.

The limestone district, extending from near Sunderland, by Houghton-le-Spring, Kelloe, Coxhoe, Ferry-Hill, and to Merrington, is mostly a dry, but not a productive loam. The soil that covers this limestone is very different from that which covers the limestone in the western parts of the county, at Frosterly, Stanhope, &c. &c. which rank amongst the most fertile soils, and best grazing lands in the north. *

A moist soft loam, incumbent on a yellow ochrey clay, impervious to water, and inimical to vegetation, is very extensively distributed through many parts of the county, and is known by the provincial, but appropriate epithet of "*water shaken*."

This variety of soil is generally thin, and the water being kept so near the surface, occasions the plants to be

* This is the case with the soils in the western parts of the North Riding of York, incumbent on a similar limestone, as on the borders of Greta, and in Swaledale, Wensleydale, Craven, &c.

thrown out by frost ; not only those of wheat, but also those of ray grass and clover : and wherever the yellow ochrey clay is turned up, nothing will vegetate.

The peaty soils are most prevalent in the western parts of the county ; the greatest portion of the moors that have been inclosed being of this description. These peaty soils are generally accompanied with substrata of yellow ochrey clay or white sand : both of them certain indications of unproductiveness.

Where the variety of soils are so indiscriminately scattered, it is scarcely possible to give any thing like an accurate statement of the quantity of each.



SECT. V.—MINERALS.

COALS are found over a considerable portion of this county. They are of the caking kind ; burn into excellent cinders, and afford few ashes. Those on the western part of the county are of the best quality, and leave the least quantity of ashes, especially those of Railey Fell, Witton Park, Bitchburn, West Pits, Lunton Hill, and Copley Bent.

The extent of coal district may be nearly ascertained by the collieries now working. On the east it is bounded by those of Jarrow, Penshaw, Rainton, Crowtrees, and Ferry Hill ; on the west by Wylam, Consit, Thornley, West Pits, and Woodlands ; on the north by the river Tyne ; and on the south by Ferry Hill, Brusleton, Cockfield, and Woodlands,—a space of 22 miles in

length, by $11\frac{1}{2}$ miles in breadth, and containing 160,000 acres, of which the water-sale collieries are about one-third, and the land-sale two-thirds; but there are several parts of this space which produce no coal, it being in those places either thrown out by dykes, or cast down so deep as not to be workable; and it is probable that workable coal will not occupy much more than 100,000 acres.

In this space are found various strata or seams of coal, of different thickness and quality. Many of those in the northern parts of the county are wrought for exportation; but those to the south and westward are wrought for landsale only. In these, the upper seam called *craw coal*,* is of an inferior quality, and not worked.

I have been favoured by Mr John Buddle, of Wall's End; Mr Thomas Fenwick, of Dipton; and Mr Thomas Laverick, of Painshaw, with the particulars of the collieries now working for exportation, as given in the following tables; and the principal part of those of the landsale collieries was furnished by Messrs Dixon, of Cockfield, who are more extensively concerned in landsale collieries, than any other persons in the county.

Those from number 1 to 15, send their coals to Tyne; number 16 and 17 send to both Tyne and Wear; and from number 18 to 34, send to Wear only.

* Not *craw coal*, as some people term it. It is derived from the *craw* or *crop* of a fowl: and in many places is called *crop coal*; and any seam coming to the surface, is said to *crop out*.

Watersale Collieries in the county of Durham.

No	Names of Collieries.	Proprietors.	Occupiers.	No. of seams.	Thicknes of each seam.	Depth of work from top of Pit.	Dist. from river.	Prod.	No. of men employed.
					Feet ins.	Fath.	Miles.	Chald. of 36 bushels.	
1	Pontop Pike	Bishop of Durham	{ Marquis of Bute, Marquis of Hertford, and Miss Simpson	1 2 3 4 1 2 3 4	5 5 6 3 4 4 6 3	6 6 0 7 4 2 10 0	40 45 75 82 20 26 82 90	70,000	233
2	Tanfield Moor	Wm M. Pitt, Esq.	Himself	1 2 3 4	4 6 0 3	10 0 0 6	7½ 7½ 7½ 7½	35,000	170
3	South Moor	{ Bishop of Durham & Sir T. Liddell, & partners	Sir T. Liddell and Partners	1 2 3 4 1 2	4 4 10 3 6 3	6 10 0 8 3 6	40 52 76 84 25 32	24,000	176
4	Marley Hill	Earl of Strathmore	Himself.	1 2	6 3	3 6	4	10,000	39
								139,000	618

Watersale Collieries in the county of Durham.

MINERALS.

13

[illegible]

Watersale Collieries in the county of Durham.

[illegible]

Waterside Collieries in the county of Durham.

<i>No</i>	<i>Names of Collieries.</i>	<i>Proprietors.</i>	<i>Occupiers.</i>	<i>No. of seams.</i>	<i>Thickness of seams.</i>	<i>Depth of working pits.</i>	<i>Dist. from river.</i>	<i>Prod. of 36 bushels.</i>	<i>No. of men employed.</i>
					<i>Feet ins.</i>	<i>Fathoms.</i>	<i>Miles.</i>		
17	Urpeth	C. Bewicke, Esq.	Brought over	1 2 3 4	4 5 3 4	6 10 4 10	7 to Tyne to 5 to Wear	767,000	3,565
18	Birtley Fell	Bishop of Durham	W. Pearce, Esq.	1 2 3 4	6 4 3 4	0 6 2 9	97 3/4 to 104	30,000	250
19	Birtley	Messrs. J. & T. Humble	Sir T. Liddell & Co.	4	4	9	3	30,000	230
			Themselves					14,000	100
								841,000	4,145

Waterside Collieries in the county of Durham.

MINERALS.

No.	Names of Collieries.	Proprietors.	Occupiers.	No. of seams.	Thickness of each seam.	Depth of working pits.	Dist. from river.	Prod.	No. of men employed.
					Fathoms.	Miles.		Chald. of 36 bushels.	
			Brought over	1	4	8		841,000	4,145
20	Beamish	Sir J. Eden, Bart.	Himself	2	4	8	32 to 64	48,000	220
21	Ouston	{ Sir R. Milbanke & - Jolliffe, Esq.	{ Tho. Wade, Esq.	1	3	0	63	20,000	120
22	Leeffield	{ Messrs Lambton, Peareth, & Co.	{ Messrs Harrison & Co.	2	5	0	75	18,000	110
23	Oxclose	{ Sir Wilfred Lawson's heirs	{ John Hudson, Esq. & Co.	1	4	10	80	30,000	140
				2	3	4			
				3	5	0			
								957,000	4,735

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MINERALS.

17

Watersale Collieries in the county of Durham.

<i>No Names of Collieries.</i>	<i>Proprietors.</i>	<i>Occupiers.</i>	<i>No. of seams.</i>	<i>Thickness of seams.</i>	<i>Depth of working pits.</i>	<i>Dist. from river.</i>	<i>Prod.</i>	<i>No. of men employed.</i>
				<i>Fect ins.</i>	<i>Fathoms.</i>	<i>Miles.</i>	<i>Chall. of 36 bushels.</i>	
24 Fatfield	Sir R. Milbanke, Bt. Himself	Brought over	1 2 3 4	6 0 5 0 3 4 5 0	60 to 90	2	957,000 60,000	4,735 300
<i>On the South Side of the Wear.</i>								
25 Penshaw	{ Sir H. V. Tempest, Bart.	Himself	1 2 3 4	3 6 6 0 4 8 3 8	116	1	60,000	365
							1,077,000	5,400

Waterside Collieries in the county of Durham.

MINERALS.

19

No.	Names of Collieries.	Proprietors.	Occupiers.	No. of seams.	Thickness of each seam.	Depth of working Pits.	Dist. from river.	Prod.	No. of men employed.
26	Penshaw	W.H.Lambton, Esq.	Brought over	1 2 3 4	3 5 4 3	6 9 6 10	Miles.	1,077,000	5,400
27	Herrington Mill	Sir J. Eden, Bart.	Sir H. V. Tempest, Bart.	1 2 3 4	3 5 4 3	6 10 7 8	1½	36,000	220
28	Biddick	Mrs Mary Lambton	Herself	1 2 3 4	3 5 4 3	6 11 7 9	1	24,000	140
								1,167,000	5,956

Waterside Collieries in the county of Durham.

MINERALS.

No.	Names of Collieries.	Proprietors.	Occupiers.	No. of seams.	Thicknes of each seam.	Depth of working pits.	Dist. from river.	Vend.	No. of men employed.
			Brought over		Feet int.	Fathoms.	Miles.	Chald. of 36 bushels.	
32	Lumley	Earl of Scarborough	W.H. Lambton, Esq.	1 2 3 4 5	3 5 4 3 3	6 9 6 2 10	90	1,257,000	6,476
33	Morton	Bishop of Durham	Ditto *	1 2 3 4 5	3 5 4 3 3	6 9 6 8 10	70	40,000	240
34	Rainton	Dean & Chapter of Durham.	Sir H. V. Tempest, Bart.	1 2 3 4 5	3 5 4 4 4	8 4 0 0 3	88	36,000	295
Total								1,333,000	7,011

* Not working at present.

Landsale Collieries in the county of Durham.

Names of collieries.	Proprietors.	Thickness of seams.		Depth of pits.	Yard.	Men.
		Fet ins.	Fathoms.			
Cocken	Carr Ibbetson, Esq.	6 0	14		Chaldrons of 86 bushels. 1,000	3
Kepier	— Musgrave, Esq.	4 8	38		7,000	14
Durham	Dean and Chapter	3 6	30		4,400	16
Pittington	Dean and Chapter	3 6	21		5,000	5
Crow Trees	Bishop	3 6	16	}	4,000	14
		4 0	25			
Coxhoe	Ditto	3 6	13	}	8,000	24
		4 6	23			
Ferryhill	Dean and Chapter	3 9	17	}	3,100	10
		5 0	24			
Eldon	Lord Eldon	6 0	22		2,600	8
Coppo Crooks	Earl of Fauconberg	5 0	26	}	4,400	14
		6 0	40			
Brusleton	Sir John Eden	5 0	10		2,000	5
					41,500	110

Landsale Collieries in the county of Durham.

Names of Collieries.	Proprietors.	Thickness of seams.		Depth of pits.		Prod.	Min.
		Feet	ins.	Fathoms.			
Bishop Auckland	Brought over	4	6	36		Chaldrons of 36 barrels. 41,500	110
Woodhouse	Bishop of Durham	5	6	48		4,400	14
Witton Park	Sir Thomas Clavering	3	6	22		8,000	30
	J. T. H. Hopper, Esq.	3	9	13		8,880	18
Railey Fell	Bishop of Durham	5	10	29		13,900	36
Ramshaw	Ditto	5	0	18		3,800	12
Norwood	Ditto	5	0	10		3,100	10
Cockfield Fell*	Earl of Darlington	5	9	8		8,000	24
		6	0	21		90,480	254

* By an inquisition post mortem, taken in 1375, Cockfield colliery is valued at 20 marks, when let to farm, which is the first landsale colliery upon record, in the county.—*Hutchinson's History.*

Landsale Collieries in the county of Durham.

Names of Collieries.	Proprietors.	Thickness of seams.		Depth of pits.	Yard.	Men.
		Feet	ins.			
Butterknowl and Copley Bent	Brought over	5	6	11	Chaldrons of 36 bushels. 90,480	254
Cow Close	Bishop of Durham	6	0	24	8,800	26
Woodlands	Earl of Strathmore & Earl of Darlington	5	6	14	1,300	4
Lunton Hill	Earl of Darlington	5	10	16	3,300	10
West Pits	Ditto	5	6	11	1,500	5
Thornley	Bishop of Durham	6	0	13	4,400	12
Birchleys	George Dixon	6	0	10	2,200	7
Helm Park	Henry Mills's executors	3	0	20	2,000	5
Woodyfield	Mrs Pearson	6	0	12	3,300	8
Birchburn	Bishop of Durham	6	0	10	2,200	6
		5	10	15	2,600	6
					122,080	343

Landsale Collieries in the county of Durham.

<i>Names of Collieries.</i>	<i>Proprietors.</i>	<i>Thickness of seams.</i>	<i>Depth of pits.</i>	<i>Prod.</i>	<i>Men.</i>
		<i>Fathoms.</i>	<i>Feet in.</i>	<i>Chaldrons of 36 bushels.</i>	
Cornsey	Brought over	3 6	13	122,080	343
Lanchester	William Russell, Esq.	3 6	a grove *	2,300	4
Charlaw	Bishop of Durham	3 2	29	1,500	2
Seggerston	Ditto	4 0	a grove	2,000	3
Whittle	John Walker	4 0	18	2,000	3
Conist	Milbanke & Jolliffe	4 6	8	5,000	9
Medomsley	Robert Curry, Esq.	6 0	12	700	2
Biremoor	Messrs Surtees & Hunter	3 6	17	6,000	10
	Sir Thomas Clavering			5,500	6
			Total	147,080	382

* A grove is where the coals are brought out at a bank side, by a drift or level.

Of the landsale collieries, the most valuable are those on the south side of the county, from which the southern part of the county of Durham, and northern parts of Yorkshire are supplied, as far as Richmond, Bedale, Northallerton, Thirsk, Stokesley, Guisbro, &c.

From the above it appears that the quantity of coals obtained in this county yearly, and the men employed, are as follows :

	<i>Chaldrons worked yearly.</i>	<i>Men em- ployed.</i>
In the watersale collieries	1,333,000	7,011
Landsale ditto - -	147,080	382
	1,480,080	7,393
Keelmen, &c. employed on the two rivers - -		3,257
Total	1,480,080	10,650

The quantity worked yearly in the watersale collieries being 1,333,000 chaldrons, (of 36 bushels,) and as each chaldron weighs 28 cwt. or 1,4 tons, hence $1,333,000 \times 1,4 = 1,866,200$ tons yearly; and as a cubic yard of coal weighs a ton, there are 1,866,200 cubic yards wrought yearly.

When the workable seams are added together, the average thickness will be about five yards.

Then the square yards in an acre $4840 \times 5 = 22200$ cubic yards per acre.

From which deduct for pillars, &c. $\frac{1}{4}$ 5550 ditto.

Leaves the cubic yards of workable coal 16,650 per A.

And the cubic yards got yearly 1,866,200

Divided by those got per acre 16650 $\frac{16650}{1866200} = 112$ } acres got yearly.

Then the acres of watersale coal 40,000

Divided by the acres wrought yearly, 112 $\frac{40000}{112} = 357$ years,

The time of working out this space of 40,000 acres.

This estimate is made on the supposition that the district is all whole coal; but as a considerable portion has been already wrought out, it is probable that there is not more coal left than will serve the present consumption much more than 200 years.

The *strata, seams, or beds of coal*, rarely lie horizontally, but generally in an inclining position, as in the annexed figure; and whatever may be the angle of inclination of one seam, if there be ever so many, they have all the same inclination. This inclination is called the rise and dip, as relating to their rising to the surface, or descending or dipping therefrom. The full rise and dip in this district is generally in a south westerly di-

Surface.

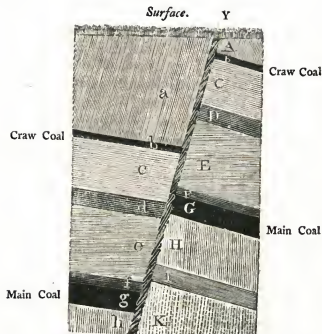


rection. This inclination of strata is a fortunate circumstance in mining ; as a seam of coal lying a mile deep at Newcastle, may by its rise come to the surface at West Auckland, and be there a workable colliery, if the stratum was to continue regular, and meet with no interruption : but this regularity is frequently interrupted and altered by fractures in the strata, occasioned by convulsions, of which we are ignorant of the causes, but find the effects to be, that the original stratification has been materially disturbed and broken, and that the adjoining parts have been one raised up, or the other fallen down, so as to separate what was once an uniform, continued, united stratum, into two parts, at several feet distance from each other, and often having different inclinations, instead of having one and the same inclination, which they originally had, before the fracture took place : these fractures are called

Dykes.

A fracture, or dyke of this kind, is represented in the fig. annexed, by Y K, where the seam of craw-coal at B, is thrown down to b, and that of the main coal at G, to g, with the intervening strata, which are all found of the same dimensions and quality, on both sides of this fracture Y K ; which is called the gut of the dyke : the breadth of which is of various dimensions, from the sides being nearly in contact, to being several yards asunder.

They are denominated up-cast dykes, and down-cast dykes, as the strata are cast up or down, according to the direction in which the colliery is working.



The gut of dykes being mostly filled with clay, they turn water so effectually, as to force it to rise to the surface, and burst out in wells or springs, which are often indications of dykes, by a series of them being found nearly in a right line.

The principal dykes found in the district of the water-sale collieries, are the following :

The main dyke (A)* which throws the strata down to the north 90 fathoms : it runs in a north westerly direction from the sea at Whitley, in Northumberland, and crosses the river Tyne near Stella, and from thence to Greenside and Leadgate : how much further to the south west it extends, has not been traced. The seams

* See the map of the county, at the beginning.

of coal on both sides of this dyke, for a considerable distance, are much intersected by ramifications from it ; some of which elevate, and others depress them.

The Tanfield Moor, or Tantoby Dyke (B) is the next in magnitude. It is a down-cast to the south, of 40 fathoms, upon Tanfield Moor, but grows less as it advances to the east and west. It crosses Derwent a little below Derwent Cote Forge, and from thence runs in an easterly direction over Tanfield Moor, from thence by Beamish Hall, and through the south part of Blackburn Fell ; from thence near Urpeth Colliery Engine, and through the collieries of Birtley Fell, Ouston, Lee-field, and Fatfield ; it is here a down-cast, of about 30 fathoms, and known by the name of the Birtley Dyke. *

This dyke, where it was worked through upon Tanfield Moor, was composed of a number of down-cast dykes, and some small up-casts, with bad coal between, making in the whole about 200 yards in width.

The Heworth Dyke (C) is a down cast of 26 fathoms to the north. Its direction is about S. 60° E. and passes through the collieries of Felling and Gateshead Fell.

An up-cast dyke (D) to the north, of from 12 to 16 fathoms, runs in an easterly direction through the collieries of Hebburn and Jarrow.

An up-cast dyke (E) of 9 fathoms to the north, passes through the north part of Ravensworth Colliery, and through Gateshead Fell : its direction is about N. 86 E.

An up-cast (F) to the north, of 9 fathoms, runs in a south easterly direction through the north part of Fat-

* In Lee-field colliery, near the village of Birtley, a spring of salt water issues from the fissures of this dyke.

field, Oxclose, and the south part of Washington collieries. A down-cast (G) of 5 fathoms to the north, runs in a south easterly direction through the south part of Fatfield Colliery.

There are several smaller dykes in some of the above collieries, but of little consequence. The above are the principal between Tyne and Wear: those on the south side of the Wear are,

A down-cast (H) of 12 fathoms to the south, running in an east and west direction through the collieries of Lambton, Bourn Moor, and Newbottle. In the last, about 200 yards farther south, there is another (I) bearing N. E. which casts down to the south 25 fathoms.

Woodstone House Dyke (J) is an up-cast to the south, of 25 fathoms, and runs in an east and west direction through the collieries of Lumley and Morton.

In Rainton Colliery (K) there are two dykes: one bearing N. 63° W. an up-cast to the south of 6 fathoms; the other is 500 yards farther south, a down-cast to the south, of 15 fathoms, bearing S. 73° W.

The above are the principal dykes in the watersale collieries. There are also several in the landsale collieries: of these, the Whinstone Dyke (L) upon Cockfield Fell, is the most material: it runs nearly in a south easterly direction by Bolam, Cotham Stob, and to Ayton, in Cleveland. It is a down-cast to the north, of three fathoms; the breadth is 17 yards of whinstone, which seems to have been in a state of fusion when it filled up this fracture; as the seam of coal for some feet distance on each side, is turned into a sooty substance, which becomes cinder as the distance from the whinstone increases, and by degrees assumes the natural appearance of

coal, with all its properties : this takes place at about 50 yards from the whinstone. On the under surface of the stratum, incumbent on that part of the seam which is converted into cinder, there is much ore of sulphur, in angular forms, of a beautiful bright yellow colour. The cinder burns clear, without any smoke, and keeps a durable heat.

There is a dyke of this kind, at Butterby, near Durham, in which, Mr Fenwick, of Dipton, informs me, he has found some small quantities of lead ore ; and thinks that in the lead mining district it may become a valuable vein.

In the lead mine district the most principal dyke is the *Burtreeford Dyke or Vein*, which is a down-cast to the west, of 80 fathoms : it crosses the Wear at Burtreeford, and runs in nearly a north and south direction.

Coals.

The coals were formerly drawn out of the pits by horses ; frequently eight were employed for that purpose, where the shafts were deep ; but a few years since machines were erected for drawing them by steam, which are now in general use.



The mode of conveying them from the pits to the water in waggons, upon wooden rail-ways, is described
 DURHAM.] D

in the Northumberland Report, but of late years, on account of the high price of wood, *iron railways* have been substituted. The most common construction of this kind of way, is by fixing pedestals P, of cast iron, in a block of stone S; into which pedestals the ends of the cast iron rails R, are inserted, and fastened by wooden pins.

The section of these rails, or their form, when viewed at the end, is that of a T; the breadth of the horizontal part on which the waggon runs, being about three inches, which is strengthened by the perpendicular rib, of about the same depth, at the deepest part D. The part below D is filled with earth; and the space between the rails is the horse road, made with stones or gravel.

The rails are generally cast three feet long, and weigh about 28lb.; the pedestals weigh from 4 to 7lb. each; so that one yard of way for a Newcastle coal waggon will weigh about 70lb.; and the expence, including the levelling and preparation of ground, * making horse and foot roads, gutters, &c. will be about 12s. per yard, or 1,056l. per mile.

Waggon ways have generally been so contrived, that the ascents were not greater than a single horse could draw a waggon up them; but some cases have happened lately, where it required more than one horse; and steam engines have been substituted for horses, for drawing waggons up those ascents. At Urpeth waggon way,

* This is sometimes very expensive, by having hollows to raise, or deep dells to cross: near Tanfield, a valley of this kind is crossed by a semi-circular arch of 102 feet span, and height, with the piers, 160 feet: the ends are filled up with earth, in some parts 40 feet deep.

five or six waggons are drawn at once up an ascent, by a steam engine placed at the top.

Mr Hutchinson, in his History of Durham, says, that waggon ways were first made and used in this county by Colonel Liddell, at Ravensworth; but upon examining the books at Ravensworth Castle, Mr Robson, (the present agent), informs me, that the first staith bills are in 1671, in the time of Sir Thomas Liddell, Col. Liddell's grand-father, and seven years before the Colonel was born. Joshua French was then staithman, and from his bills, beginning with that year, it appears that coals were then led by waggons to Team Staith.

Lead Mines.

The lead mines are situated in the western part of the county, and begin a little to the westward of where the coal district terminates. If a line be drawn from Allansford to Barnardcastle, no lead mines worth working, have been found to the east of it, except Healy Field, and no coal to the west.

Lead ore is mostly found in what the miners call veins, which have been fractures or openings in the regular strata (the same as dykes in collieries) and filled up again with extraneous matter, as lead ore, zinc ore, calcareous spar, fluor, quartz, terra ponderosa, soft mineral soils, &c. and the mine is rich or poor, in proportion to the greater or less quantity of lead ore to those substances. Where the adjoining strata are limestone, the vein generally produces the greatest proportion of ore; and the least, where the adjoining strata are freestone, or indurated argillaceous earth, called plate

beds; * hence the miners say the limestones are the best bearing sills or strata, and the freestone and plate beds the worst; and of the different strata of limestones, that which is called the great limestone, being 70 feet thick, has probably produced more ore than all the other strata together.

I have obtained an account, (with the assistance of a few friends), of all the lead mines now working in Derwent, Weardale, and Teesdale, as in the following tables.

* In Shropshire the plate beds are productive of ore.

Lead Mines in the county of Durham, working in 1809.

NO	NAMES.	OWNERS.	OCCUPIERS.
----	--------	---------	------------

In Derwent.

1	Healy Field	Dean and Chapter	Elliot and Co.
2	White Heap	William Orde, Esq.	Monkhouse and Co.
3	Ramshaw	Ditto	Ditto
4	Jeffrey's Rake	Mr Scott	Easterby, Hall, & Co.

In Weardale. North side of the river.

5	Frosterley	Robert Wright	Wm Bell & Co.
6	Crow Lane Side	Bishop of Durham	Colonel Beaumont
7	Stanhope Burn	Cuthbert Rippon	Quakers Company
8	Brandon Wells	Dean and Chapter	Jopling & Co.
9	Stotfield Burn	Ditto	Ditto
10	Lintz Garth	Bishop of Durham	Colonel Beaumont
11	Rispley	Ditto	Ditto
12	Wolf Cleugh	Ditto	Ditto
13	Grove Rake	Ditto	Ditto
14	White's Level	Ditto	Ditto
15	Slit	Ditto	Ditto
16	Middlehope	Ditto	Ditto
17	Level Gate	Ditto	Ditto
18	Westfall Level	Ditto	Ditto
19	Black Dean	Ditto	Ditto
20	Breckon Syke	Ditto	Ditto
21	Pasture Grove	Ditto	Ditto
22	Sedling	Ditto	Ditto
23	Pudding Thorn	Ditto	Ditto
24	Kilhope	Ditto	Ditto

South side of the river.

25	Sraith Head	Ditto	Ditto
26	Cowhirst	Ditto	Ditto
27	Langtey Head	Ditto	Ditto
28	Burnhope	Ditto	Ditto
29	Barbary	Quakers Company	Themselves
30	Colberry	Bishop of Durham	Colonel Beaumont
31	Hawkwell Head	Ditto	Ditto
32	Chapel Pasture	Ditto	Ditto
33	Newland Side	John Walton	Jonathan Vickers
34	Loftley Side	Mess. Twedle & Co.	Henry Walton & Co.
35	Quarry Hill	Ditto	Ditto
36	Billy Hope	Rector of Wolsingham	Ditto
37	Coves	Mrs Leaton	C. Emerson & Co.
38	Drybourn Side	John Harrison	Himself and Co

Lead Mines in Teesdale.

NO.	NAMES.	OWNERS.	OCCUPIERS.
1	Fleak Bridge	Wm Hutchinson, Esq.	London Company
2	Wire Gill	Earl of Darlington	Ditto
3	East Rake	Ditto	Ditto
4	West Rake	Ditto	Ditto
5	Manor Gill	Ditto	Ditto
6	Marlebeck Head	Ditto	Ditto
7	Old Marlebeck	Ditto	Robinson & Co.
8	High Dyke	Ditto	Earl of Darlington
9	Skiers	Ditto	Walton & Co.
10	Elketory	Ditto	Hopper & Co.
11	Racket Gill	Ditto	Little & Co.
12	Parkin Gill	Ditto	Chayters & Co.
13	Hudshope Head	Ditto	Ditto
14	Coldberry	Ditto	Sherlock & Co.
15	Red Groves	Ditto	Ditto
16	Hesley Band	Ditto	Coatsworth & Co.
17	Hungary	Ditto	March & Co.
18	Hope Slit	Ditto	John Hunt & Co.
19	Stable Edge	Ditto	Ditto & Co.
20	Blakeley Green	Ditto	Bedale & Co.
21	Bayles Hush	Ditto	Armstrong & Co.
22	Flushmere	Ditto	Sherlock & Co.
23	Old Pike Law	Ditto	March & Co.
24	Bradley Hill	Ditto	Sherlock & Co.
25	Tarn Streak	Ditto	Walton & Co.
26	New Streak	Ditto	Hopper & Co.
27	Flush	Ditto	Sherlock & Co.
28	Westerhead	Ditto	Ditto
29	High Hurth	Ditto	Hutchinson & Co.
30	High Langdon	Ditto	Seat & Co.
31	Low Langdon	Ditto	Bedford & Co.
32	Botany Bay	Ditto	March & Co.
33	Langdon Head	Ditto	Ditto
34	Grass Coldberry	Ditto	Hall & Co.
35	Bands	Ditto	Barker & Co.
36	Trough Head	Ditto	Byers & Co.
37	Rough Rigg	Ditto	Featherston & Co.
38	Fair Play	Ditto	Hindmarsh & Co.
39	Scar Head	Ditto	Robinson & Co.
40	Hawkside	Ditto	Hackward & Co.
41	Grass Hill	Ditto	Nixon & Co.
42	South Langty	Ditto	Bland & Co.
43	North Langty	Ditto	Ditto
44	Ashgill Head	Ditto	Ditto
45	Hunter Moss	Ditto	Ditto
46	Willy Hole	Ditto	Winter & Co.
47	East Crowgreen	Ditto	Watson & Co.
48	West ditto	Ditto	Featherston & Co.

The list of the mines in Weardale begins at the East-most Mine, on the north side of the river, and proceeds westwards to Kelhope, (No. 24,) and then comes down the south side, in the regular order they are placed in.

Of the mines working to profit, the following may be considered of that description :—Jeffries' Rake, Brandon Wells, Wolf Clough, Breckon Side, Pasture Grove, Sedling, Hawkwell Head, Chapel Pasture, and Coves; Wire Gill, Marlebeck Head, Old Pike Law, High Langdon, Grass Hill, and Ashgill Head : many of the others raise little ore; and some are working to a considerable loss.

The rent paid to the proprietors of mines by those who rent them, is generally one-fifth of the ore.

The number of people employed about these mines, I have not been able to ascertain. Their earnings on an average are about 40l. a year each man.

Lead ore is wrought by the bing of 8 cwt. 4 of which or 32 cwt. of clean ore, generally produce a ton or 20 cwt. of lead. The produce of silver from lead varies much : if a ton will not yield eight ounces, it is not worth refining.

Smelting.

Improvements in smelting have been made of late years, by roasting *refractory ores*. The manager of a smelt mill furnished me with the following experiment, made on the same kind of ore.

			ewt.	grs.	lbs.
To make a ton of lead, it took of un-					
roasted ore	-	-	46	3	0*
Ditto, of roasted ore	-	-	41	2	0

A portion of lead is always retained in the slag, to obtain which, recourse was had to powdering the slag by hammers, which was not only expensive, but very detrimental to the health of the persons employed: this is now performed by running the hot slag as it comes from the hearth, into a cistern of cold water, by which it is pulverized more effectually than by hammers, and without any injury to the workmen.

From the recommendation of the Bishop of Landaff, in his Chemical Essays, horizontal chimneys are generally adopted, instead of perpendicular ones; by which the particles of lead that used to escape in a state of vapor, are condensed, and the chimneys being swept at proper intervals, a considerable portion of lead is obtained, that used formerly to be lost.

* This is not clean or washed ore; but ore mixed with other substances that could not be separated in washing.

Smelt Mills.

NAMES.	OCCUPIERS.
--------	------------

In Derwent.

Jeffereys	Easterby, Hall, & Co.
Feldon	— Errington, Esq.
Old Mill	Monkhouse & Co.
Healey Field	Elliot & Co.

In Weardale.

Bollihope	Anthony Hopper, Esq.
Stanhope Burn	Quakers Company
Rookhope	Colonel Beaumont

In Teesdale.

Eggleston, three mills	{ Wm Hutchinson, Esq.
Gaunless	{ 'and D. Crawford
Langdon	{ Earl of Darlington
	{ Ditto

Iron Ore.

Iron ore is found in abundance in the western parts of the coal district, and great quantities have been smelted at some former and remote period, as appears by the immense heaps of iron slag found in various places on the commons of Lanchester, Tanfield, Hamsterly, Evenwood, &c. &c. Tradition says they were the works of the Danes; but of this there are no authentic records. In

later times, there is evidence of their being worked, as
 “ in 1368, Bishop Hatfield granted a bloomery, at
 “ Gordon, in Evenwood Park, at sixteen shillings a
 “ week, the dry wood for that purpose to be delivered
 “ by some person deputed by the Bishop.” *

“ In 1430, Bishop Langley leased to Robert Kirk-
 “ house, yron-brenner, all his wood, to be brenned into
 “ charcole, yat growes between Stanlawe Burn and
 “ Westside, and the town of Crawcrook, and the wood
 “ of the abbot of Newminster; except oke, esh, hollyn
 “ wod, appiltre, and crabtre; and also except all wode
 “ fit for fellyes or beams, which shall always be felyed
 “ before the colyers make cole. The Bishop to find
 “ ground for the smitheis, and grasse for six horses.
 “ The said Robert to win stone ore at Kirkhaugh,
 “ Rookup, or the north syde of Stanhope Parke, paying
 “ for a dosyne of ore, two stone yryn; and for tenne
 “ dosyne of coles, 20 stone of such yryn as the same
 “ shall doo and brenne.” †

Millstones.

About four miles north of Stanhope there is a mill-
 stone quarry, where millstones of the grey or freestone
 kind, are gotten, of the very best quality. The bed of
 stone is 21 feet thick, but there are only about ten feet
 of this of the real millstone quality: above which is a
 seam of finer freestone, of the same depth. The aver-
 age number sold is about forty yearly.

* Hutchinson's Durham. p. 338.

† Enrolled at the Chancery at Durham. Robert Surtees; Esq.

Grindstones

Have been wrought for a great number of years upon Gateshead Fell, by Malin Sorsbie, Esq. and his progenitors. He has been kind enough to favour me with the following particulars.

They are classed in eight different sizes, called *foots*, according to their dimensions, as in the following table.

<i>Denominations.</i>	<i>Diameter.</i>	<i>Thickness.</i>	<i>No. in a Chaldron.</i>
	<i>Inches.</i>		
1 <i>Foot</i> s	10	2	36
2 <i>Foot</i> s	14	2½	27
3 <i>Foot</i> s	20	4	18
4 <i>Foot</i> s	28	4	9
5 <i>Foot</i> s	35	5	5
6 <i>Foot</i> s	42	6	3
7 <i>Foot</i> s	50	6	1½
8 <i>Foot</i> s	56	8	1

A grindstone foot is 8 inches: the size is found by adding the diameter and thickness together. Thus, a stone 56 inches diameter by 8 thick, making together 64 inches, is an 8 foot stone, of 8 inches each foot.

Besides the above sizes, grindstones are made, *when ordered*, of any intermediate dimensions: many are made much larger than any of the above sizes, some as large as 76 inches diameter, and 14 or 15 inches thick, which are a great weight—a cubic foot weighing 1 cwt. 1 qr. 14 lbs.

The quantity made annually, as nearly as can be ascertained, is five thousand chaldrons; each chaldron

weighing about 14 cwt. The present price is 1*l.* 7*s.* 0*d.* per chaldron.

They are sent to every port in Europe, and some to America and the West Indies; but the greatest demand in times of peace is for Holland and France.

Freestones for building are met with in various parts of the county; and one is found at Heworth, upon the estate of Anthony Hood, Esq. of an open porous nature, that stands fire in the glass house furnaces better than any other stone or bricks they have hitherto tried.

Slates for roofing, of the freestone kind, (called grey slates), are found in many places in the western parts of the county.

Silver sand has been discovered upon Sir Ralph Milbanke's estate at Seaham, which has been tried, and answers perfectly well for the manufacture of the finest glass.

Limestones abound in various parts. Upon entering the county at Piercebridge, from the south, there is a limestone district, bounded by Piercebridge, Consley, Umby, Denton, Killerby, Langton, and Morton. Another farther north, on the ridge extending from Houghton by Heighington, to Aykley. The next is that tract of hilly country extending from Merrington, by Ferry Hill, Bishop Middleham, Coxhoe, Sherburne, Ellemore, Houghton-le-Spring, Pallion, Boldon, and Cleadon, and from thence extends southward along the coast to near Hartlepool. From this tract of country, there is no limestone to the westward, until the lead mining district commences, in which limestones of the best quality abound, both in Teesdale and Weardale: in the latter there is one near Frosterley, which takes a fine polish,

and is so variegated, as to be denominated marble, and used for chimney pieces and tomb stones.

Whinstones are gotten in different parts of the Cockfield Fell Dyke, and at many other places in dykes of a similar description, for repairing roads, for which purpose they are superior to any other materials yet discovered. Those on Cockfield Fell contain iron in a metallic state, which a magnet attracts from the powdered stone.

An argillaceous stone, called the black metal stone, which lies above the coal at Derwent Cote Forge, when ground and mixed with a certain portion of sand, makes bricks, which stand fire much better than any made from common clay.

Yellow ochre is found on the estate of Charles Spearman, Esq. at Thornley, and wrought and manufactured by the colour makers.

SECT. VI.—WATERS.

THE principal rivers communicating with the sea, are the Tyne, Wear, and Tees. The tide flows up the first as far as Newburn; up the Wear to Picktree; and up the Tees to Worsall, about three miles above Yarm.

The principal of those that empty themselves into the Tyne, are the Derwent and Team; into the Wear, the Browney, Gaunless, and Bedburn; and into the Tees, the Skern.

The fish in these rivers are salmon, trout, eels, che-

Springs.

The only springs deserving of notice, are the salt springs near Birtley, and the spaws at Butterby and Dinsdale, &c.

Birtley salt spring was discovered about 25 years since, in making a colliery drift, at the depth of 140 yards.

Rout of Salmon Fishings on the Tweed continued.

Brought over	£3,916	Brought over	£10,456
Gardow Batt - -	150	Needle Eye - -	200
Bailiff's Batt - -	230	Canny - -	100
Shoreside, &c. - -	1,500	Addermouth - -	700
Out Water Stell - -	350	Broad - -	500
Hudshead - -	300	Hugh Shield - -	900
Cheswick Seas - -	280	South Bells - -	400
Goswick Seas - -	80	North Bells - -	120
<i>Above Bridge.</i>		Yard Ford - -	500
Blackwell - -	320	Finchey - -	150
Pool - -	1,050	Hart - -	300
White Sands - -	1,050	Scotch New Water	400
Yarrow - -	700	From ditto to Norham	540
New Water - -	380	Norham to Coldstream	300
Todhill - -	90	Coldstream to Kelso	200
Clayhole - -	60		
Carried over	£10,456	Total	£15,766

The average number of boxes of raw salmon sent to London (packed in ice) in the years 1806 and 1807, was 8,445, of 8 stone each, or 67,560 stone, which, at 16*s.* per stone, is 54,000*l.* If there be added the value of what is kitted for exportation, and what is sold fresh or dried in the neighbourhood, the amount cannot be less than 60,000*l.* a year.

It is conveyed from the place where it issues, to the bottom of a pit (about 250 yards) from whence it is raised in pumps by the colliery steam engine: the spring is very regular, as the quantity of water has never been known to vary, and it is as strong now as when the salt works first began, which was soon after its discovery. The quantity of salt made yearly, is about 1,100 tons, for which 30*l.* per ton duty is paid; and the salt is now sold at 35*l.* per ton; of which a considerable quantity is sent to London, and the remainder sold in the adjoining counties.

Butterby spaw is situated near Durham. In the bed of the river Wear "is a considerable spring of salt water, mixed with a mineral quality. The situation of this spring subjects it to a mixture of fresh water, so that it is difficult to tell how much salt it contains in its purest state. On several trials, it has yielded double the quantity produced from sea water. The shore, for a considerable distance, shows *oozings*, or small issues of salt water; from which circumstance, and by a dyke or break of the rocks, in the channel of the river, a little above the spring, it is presumed a rock or bed of salt might be won, of some value. It is much resorted to in summer, for its medical qualities: half a pint of water is sufficiently purgative for the strongest person. Within a few yards of the salt spring, on the opposite shore, is a fluent spring, strongly impregnated with sulphur. Dr Elliot, in his account of the medicinal virtues of mineral waters, says, it is a strong sulphureous water, and also impregnated with sea salt." *

* Hutchinson's History of Durham. p. 325.

Dinsdale spaw was discovered in 1789, in searching for coal. After boring through red freestone and whinstone to the depth of 24 yards, the spring burst forth with a strong sulphureous-smell. This property induced some experiments to be tried in chronic and cutaneous disorders: some remarkable cures in rheumatic and herpetic complaints added greatly to its celebrity. In 1797, a proper bath was built for the convenience of cold bathing, and a warm bath was afterwards added, with suitable dressing rooms: and it is to be hoped the owner, J. G. Lambton, Esq. will enlarge the accommodations, that the public may have the benefit of this valuable sulphur water, which Mr Peacock, in the analysis which he published of it, thinks more efficacious in many disorders than those of Harrowgate.

About two miles above Barnardcastle, a sulphur water springs from the crevices of a rock in the bed of the river Tees, on the Durham side. It is impregnated with the same ingredients as the Harrowgate water, and used in the same way: has been known to cure obstinate cutaneous eruptions.*

* Hutchinson's History of Durham. p. 521.

CHAP. II.

STATE OF PROPERTY.

SECT. I.—ESTATES, AND THEIR MANAGEMENT.

FROM the best information I could obtain, the rentals of the principal estates may be classed as follows :—

	£.		£.	
2	from 20,000	to	22,000	per year.
3	from 12,000	to	14,000	ditto.
2	from 7,000	to	8,000	ditto.
3	from 4,000	to	5,000	ditto.
And several	from 1,000	to	3,000	ditto.

From which they descend by regular gradations to the smallest sums.

As to the mode of management, there is considerable difference: some estates are let by proposal; but the general mode of letting is, by asking a rent, and treating with the tenants six or seven months before the expiration of the term, which on some estates does not exceed three years; some extend to seven, and a few to nine or twelve.

The time of entry is Old May Day; the rents are made payable half-yearly, on the 23rd November, and the 13th May; but upon most estates they are not received for three or four months after.

On some estates the landlord pays the land-tax ; but all other taxes are paid by the tenants.

The old grazing lands are not allowed to be ploughed, and the tenant is restricted not to exceed a certain stipulated quantity in ploughing or tillage.

Of late years some landlords have agreed to drain, on being allowed 7 per cent. for the money expended ; others agree to cut, lay the stones, and fill in the drains ; the tenant finding and leading stones : but in either of these modes the tenant ought to have a term of longer endurance than either three or seven years.

The tenant at quitting has a way-going crop from off two thirds of the lands in ploughing ; with the use of the stack-yard, barn, and granary, for one year after the expiration of his term, leaving the straw for the use of the entering tenant.

All mines, minerals, woods, and plantations are reserved, with liberty to work mines, make new plantations, roads, &c. paying a full recompence for damages occasioned by any of the above reservations.

SECT. II.—TENURES.

THE tenures by which landed property in this county are held—are freehold, copyhold, and leasehold ; the proportion of each it would be difficult to ascertain, but the freehold is certainly the largest ; the southern part of the district being mostly freehold, and also some of the largest estates in other parts of the county.

The copyhold lands are held under the Bishop of Durham, by copy of court roll, kept and recorded at Durham, in the Halmot Court of the Bishop, as Lord of the several manors wherein such estates are situated.

They pass by surrender and admittance, which states them to be held at the will of the Lord, but complying with the several requisites, they are now copyholds of inheritance.

They are subject to certain small annual quit-rents, and to demise fines.

These copyholds pass in descent like freeholds, and are deviseable by will, provided the *legal estate* be not at the time vested in the testator ;—for which purpose it is the universal custom on purchases, &c. to have the surrender passed by the vendor, or his trustees, to trustees named by the purchaser to the use of his will.

If the copyholder neglect naming such trustees, and die with the legal estate vested in him, the estate will go to the heir at law, as in the case of no will in freehold, with this difference, that the widow, instead of her thirds, is intitled to the *whole, for her life*, as her frank bank.

The Bishop is entitled to one-third of the woods, and the tenant cannot cut them for *sale*, without first compounding for the Bishop's licence ; but he may cut for repairs of the premises without such licence.

He is also intitled to all the royalties of mines and quarries.

The copyholder cannot make a valid lease for more than one year, without a licence obtained from the Lord, wherefore an action of ejectment has been non-suited,

by the declaration stating a demise for *seven years*, not being able to prove such licence.

The tenant must appear, or essoin to the Bishop's manor courts, &c. &c.

The *church leases* are either for twenty-one years, or for three lives. The leases for years may be renewed every seven years, on paying a fine of one year and quarter's rent, or real annual value of the lands. And when one of three lives drops, another may be renewed for a like fine of one and a quarter's yearly rent; and for renewing two lives, eight years annual value.*

In the year 1800, the Bishop obtained an act of parliament for enfranchising copyhold or customary estates, and for the sale of several ancient chief rents, quit rents, fee-farm rents, acre rents, &c. issuing out of freehold and copyhold or customary estates, &c. on the following terms :—

* A gentleman resident in the county, remarks,—“ That these fines
“ operate like tithes, as penalties on improvements. This is an obvious
“ and direct effect of the tenure, but they prove injurious too, by their
“ oblique malignity. The leaseholder dare not let the farmer a long
“ term, lest he should be induced to better the ground, and the land-
“ lord be fined for his tenant's improvements. And leasehold is so very
“ frequently intermixed with freehold, in a multitude of farms, that
“ the fate of the one is too often dependent on the other, not greatly to
“ suffer by the connection. Leasholds which are convenient to the
“ occupation of freeholds, derive a value from their situation, which
“ encreases with the rent of the freehold, and the fine is advanced accord-
“ ingly.

“ There is another mischief incident to these leaseholds, (in common
“ with copyholds,) which in a national as well as individual point of
“ view, is of great importance. No wood can be planted with any
“ prospect but that of being punished for the improvement.”

“ Rents, &c. out of Freehold Estates

“ At twenty-one years purchase; deducting the land-tax thereon, as hitherto allowed.”

“ For enfranchising the Copyhold or Customary Estates.

“ I. Twenty-one years purchase to be paid for the quit rents, &c. issuing thereout, deducting the land-tax, as hitherto allowed.

“ II. Three times the amount of the demise or admittance fine, payable on alienation or descent, as per the margin of the surrender or admittance, by which the premises are held.

“ III. One-third of the value of the timber, trees, and wood, growing on the premises (except the timber, trees, and wood growing on the copyhold allotments set out on the division of Lanchester and Chester Commons) in lieu of the present, and all future growth.

“ IV. One year's purchase or value of the premises, for the enfranchisement and change of tenure, into an absolute freehold estate, freed and discharged from all suit of court, services, and other restrictions.

“ N. B. The yearly value of the premises, and also the value of the timber, trees, and wood, to be ascertained by such person or persons as shall be appointed by the Lord Bishop of Durham for that purpose.

“ V. The mines, minerals, and quarries, within and under the ancient inclosed lands and premises to be enfranchised, are to be reserved to the Bishop and his

“ successors, with all such powers and liberties of winning, working, leading, taking, and carrying away the same, and in as full, ample, and beneficial a manner, to all intents and purposes, as the Bishop is now entitled to, he and they making full satisfaction for the damage or spoil of ground to be occasioned thereby, to the person or persons, whose grounds shall be damaged or spoiled by the use or exercise of such powers and liberties: but with respect to allotments to be enfranchised, set out on the division of commons under particular inclosure acts, the mines, minerals, and quarries therein are also to be reserved, with the same powers and liberties of winning, working, leading, taking, and carrying away the same, or any other mines, and in the same manner, and to the same extent, as the Bishop is now entitled to under the reservations in those respective inclosure acts, making, or not making, satisfaction for damage or spoil of ground, as therein is provided.”

CHAP. III.

BUILDINGS.

SECT. I.—HOUSES OF PROPRIETORS.

OF the houses of proprietors, “whether they are advantageously situated,” “well planned for country gentlemen of moderate fortune,” “or elegantly constructed,” I do not pretend to judge :—this is a subject more proper for the decision of an architect than an agriculturist. I shall therefore only give a few of the principal in a tabular form.

<i>Proprietors.</i>	<i>Places.</i>	
Earl of Darlington	Raby Castle	Ancient, magnificent, and noble edifice
	Sellaby	Old
	Streetlam Castle	Rebuilt, & modernized about the beginning of the last century, and left unfinished
Earl of Strathmore	Gibside	Modernized: begun by the late Earl, and finished by the present
	Hilton Castle	Ancient
Earl of Scarborough	Lumley Castle	Ditto
Bishop of Durham	Auckland Castle	Ditto
	Durham Castle	Ditto
Sir T. Liddell, Bart.	Ravensworth Castle	Rebuilding on a large and magnificent plan
	Newton Hall	Old brick building
	Bradley	Modern
Sir John Eden, Bart.	Windleston	Ditto
	Beamish	
Sir H. V. Tempest	Winyard	Modern
	Long Newton	Old
Sir R. Milbanke	Seaham	Modern
Sir Thomas Clavering	Axwell Park	Ditto: fine situation
J. G. Lambton, Esq.	Lambton	Modernized
	Brancepeth Castle	Ancient
Wm Russell, Esq.	Hardwick	Ditto
	Croxdale	Modern
W. T. Salvin, Esq.	Old Park	
R. Wharton, Esq.	Whitworth	Modern
R. E. D. Shafto, Esq.	Binchester	Ditto
	Hetton-le-Hole	Old
John Lyon, Esq.	Newton Cap	Rebuilding
— Bacon, Esq.	Witton Castle	Repaired a few years since: the main walls of the old castle remain unaltered
J. T. H. Hopper, Esq.		

SECT. II.—FARM HOUSES AND OFFICES.

OF this class of buildings I have not found any meriting particular notice for improved convenience, or superior contrivance.

SECT. III.—REPAIRS.

WHERE lands are let upon lease, the general custom is for the landlord to put in repair at entry, and the tenant keeps and leaves in repair; except the main walls and timbers. Where no leases are let, the landlord repairs.

SECT. IV.—PRICES OF BUILDING.

Materials and Artisan's Labour.

THE materials used for the walls of buildings are either stones or brick; the timber mostly fir; the covering either Westmoreland slates, Scotch slates, freestone slates, tiles, straw, or ling: the latter only in the western parts of the county.

Materials, and their Prices.

	£.	s.	d.
Stones quarrying, per square yard	0	0	8
Bricks, per thousand	1	5	0
Westmoreland slate per yard	0	5	0
Scotch slate ditto	0	5	0
Freestone slate	0	2	9
Tiles per thousand (red)	3	15	0
Ditto ditto (blue)	6	6	0
Straw per threave	0	2	6
Ling per ditto	0	0	6
Lime per cart load of 24 bushels	0	6	0
Norway logs of fir timber, of late years, 3s. per foot.			
1½ inch deals,			
ditto	4s.		each.
Three feet laths for plastering, 4s. per hundred.			

ARTISAN'S LABOUR.

Mason Work, &c.

	£.	s.	d.
Common stone wall, per square yard	1	3	
Ashler ditto ditto	2	2	
Brick wall, 15 inches thick, ditto	0	9	
Ditto, partitions, ditto	0	3	
Polished hewn work, per foot	1	6	
Flagging, per yard	4	0	
Plaistering, per ditto	0	4	
Ditto, ceiling	0	6	
Roofing with slates, per yard	1	0	
Ditto, with tiles, per thousand	20	0	
Ditto, with straw, per square yard	0	2	

Carpenter Work.

			s.	d.
Roofing, per square, best	-	-	12	0
Ditto, common	-	-	7	6
Joisting	-	-	4	0
Flooring, per yard, grooved	-	-	1	3
Ditto, plain	-	-	1	0
Doors, per foot	-	-	0	6
Windows, per ditto	-	-	0	6

SECT. V.—COTTAGES.

THE cottages in this county are in general comfortable dwellings of one story, covered with thatch or tiles, and are much the same as found in other districts. Sir John Eden has some of two stories, with a garden in front, and conveniences behind, which are the neatest and best I have observed—but they are something superior to common cottages.

SECT. VI.—BRIDGES.

IN noticing the bridges, I shall take those on the principal rivers, and begin with

1st. *Stockton Bridge.*

The only passage over the Tees at Stockton, was by a ferry-boat, until 1771, when an elegant bridge of five arches was finished: the span of the centre arch being 72 feet, the two next 60 feet, and the end arches 44 feet each. The passage for carriages is 18 feet, and a raised flagged way of three feet for foot passengers. The expence of building 8,000*l.* the tolls let for 700*l.*: when the debt is discharged, it becomes a free bridge.

2nd. *Yarm Bridge*

Is the next in succession: it is an old structure, consisting of three gothic, and one semi-circular arch, with a road-way of 14 feet, and of course exceedingly inconvenient where there is so great a passage: to remedy this, it was agreed by the magistrates of Durham and Yorkshire, to build an iron bridge, which was completed in 1806, and fell in January, 1807. This accident has been attributed to different causes, but from what I saw, I suspect it owing to the insufficiency of the piers to resist the weight of an arch of 181 feet span, and 17 feet versed sine. Some attribute it to the expansion and contraction of the metal. The carpenter informed me that by the expansion of the metal, the top of the arch rose in one day $1\frac{1}{4}$ inches, and in general when the weather was hot, $1\frac{1}{4}$ inch. From this place we have no more bridges until we come to the great post road, where we meet with

3rd. Croft Bridge,

Which was widened a few years since, and the road-way made 40 feet wide : it consists of seven arches.

4th. Pierce Bridge

Has three arches ; the road-way 25 feet wide, and a flagged foot path of $2\frac{1}{2}$ feet wide on each side, making the whole width 30 feet.

5th. Winston Bridge.

This bridge was built in 1764 : it is a large segment of a circle, the span 111 feet, the road-way 20 feet, and is of vast utility for facilitating the carriage of coal and lime from the county of Durham to the north riding of Yorkshire. The next is

6th. Athelstan Abbey Bridge,

A beautiful edifice of one semi-circular arch, built by Sawrey Morritt, Esq. about 30 years since, to connect the opposite shores, separated by perpendicular rocks at a narrow part of the river.

7th. Barnardcastle Bridge

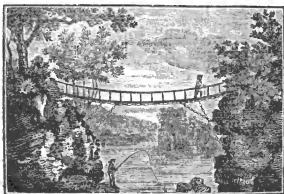
Is an ancient structure of two high Gothic arches ; the piers founded on freestone rock.

8th. Eggleston Bridge

Of two arches, and a narrow road-way, is the most western stone bridge upon this river; but further up the river, about two miles above Middleton, we come to

9th. Winch Bridge,

Which is probably unique in its construction, being a *wooden bridge* laid upon *iron chains*, firmly fixed into the rocks on each side the river. The width from rock to rock is about 70 feet. To keep the bridge steady, and prevent its vibrating, chains are fixed on both sides, about one-third from each end, and the ends of those chains made fast in the rock. As bridges of this kind may be useful in similar situations, I annex a view of it.



If the last bridge on the Tees be unique in its kind, the first on the Wear stands yet unrivalled ; this is

10th. The Iron Bridge at Wearmouth,

Built in 1795 and 1796, from a model upon a new construction, contrived by Rowland Burdon, Esq. of uniting hammered iron with cast iron. The arch is a segment of a circle, the chord or span 236 feet, and versed sine 34 feet ; the breadth or road-way 32 feet ; its height from the river at low water 100 feet, to allow vessels to sail under it without striking their masts. The expence of building was 27,000*l.* and the yearly amount of the tolls is 2,030*l.*

The weight of cast iron is	214 tons.
Ditto of malleable iron	46 ditto
Total	260 tons.

11th. Chester Bridge

Consists of three arches ; the road-way 12 feet wide ; a place of not much passage.

12th. Durham Bridges

Are the next. Framwellgate Bridge and Elvet Bridge, both on the post road, are within 200 yards of each other. The first has two elliptical arches, the road-way 15 feet, which is far too narrow for the passage there is

upon it; and this inconvenience is encreased by the right angular turns at each end. *It has stood nearly 700 years.* Elvet Bridge was widened to 27 feet in the year 1805, at the expence of 7,000*l*.

About 200 yards above Framwellgate Bridge, in 1781, the Dean and Chapter built a beautiful bridge of three arches for their own convenience. They allow gentlemen's carriages to pass without toll. The public have a right of passing with horses.

On the road to Stockton, at the distance of one mile from Durham, is

13th. Shincliffe Bridge,

Of three arches, and narrow road-way: rebuilt in 1753.

About four miles from Durham, along the post-road, we reach

14th. Sunderland Bridge,

Of four arches; the road-way only 14 feet wide—a great inconvenience upon so very public a road

15th. Newton Cap Bridge,

Near Bishop Auckland, is the next, of two lofty Gothic arches; the road-way about 14 feet. It is not upon any turnpike road.

16th. *Witton-le-Wear Bridge*

Is the last upon this river, of any consequence. It is of two arches, and road-way about 14 feet. It is a place of no great passage, though the Watling-Street turnpike passes over it.

Over the river Derwent there are very few bridges : the first is

17th. *Derwent Bridge,*

Near the mouth of the river, It is a modern, elegant, and substantial structure of three arches, and spacious road-way.

18th. *Shotley Bridge*

Is the next ; of two arches and narrow road-way ; and a few miles above, is

19th. *Allansford Bridge*

Of two arches also. These scarcely deserve noting, except that the first affords a passage for the turnpike from Gateshead to Black Hedley, and the other to the Watling-Street turnpike.

There are numerous other bridges over small rivers and brooks, which it would be tedious and of little use to enumerate.

CHAP. IV.

O C C U P A T I O N.

SECT. I.—SIZE OF FARMS.

THERE are no very large farms in this county: the largest are—Saltholm, about 1,000 acres; Bradley, 800; Harperley, Thrisleton, Stillington, Ketton, and Denton, about 600 each; Summerhouse, Nunstainton, Sherburn House, Horden Hall, Eden Hall, Layton, and Darlington, from 400 to 500 acres; and from 400 to 150 acres, there are a considerable portion; but the greatest number is from 150 to 50, and a great many less than 50 acres.

SECT. II.—FARMERS.

IN this, as well as in every other district I am acquainted with, the occupiers of large farms have been the first to make improvements—to introduce new implements, new modes of culture, and improved breeds of live stock. It is men of education and superior intelligence, who travel to examine the cultivation of distant coun-

tries, and improved breeds of cattle, sheep, and other animals, and who have capital to carry into effect whatever they may think will improve their own districts.

Messrs Culley and Charge were the first that led the way; and they have been followed by Messrs Collings, Mason, Taylor, Trotter, Nesham, Seymour, and many others, by whose exertions and judicious selection, this district will be lastingly benefited.

But the greatest number of farmers in this county being occupiers of small farms, are in general persons of confined capital, brought up from their childhood with working at every operation necessary to be performed upon the farm. The little education they obtain, is generally in the winter months, (from the end of harvest until the season becomes favourable for putting in the spring seed): being thus enured to hard labour from their early youth, when they become farmers themselves, they continue still to work, but with increased exertion, anxiety, and care; and a farmer of this class is a much greater slave than any servant he keeps, being generally employed through the summer in some kind of work or other, from four o'clock in the morning till eight at night; and in every other season of the year from twilight to twilight; and may truly be said, "to rise early, take rest late, and eat the bread of carefulness."

SECT. III.—RENT.

RENTS have been increasing for several years back, and many farms have been lately let for double the rent which they could be let for twenty years since.

Lands of the same quality are let for more or less per acre, according to climate, vicinity to markets, facility of getting manure, or for convenience.

In favourable situations in the lower parts of the county, the best grazing pastures and meadow grounds are rented at 2*l.* to 3*l.* an acre ; in the western parts, as in Weardale, from 30*s.* to 50*s.*

Near towns, the rents are from 4*l.* to 5*l.* per acre, and arable lands of the best quality are let from 2*l.* to 3*l.* per acre. On Ryton Haugh some are let at 4*l.* an acre. From these high prices, lands for pasture or corn are let at all intermediate rents down to five shillings per acre, and mountain pastures from that to sixpence per acre, and in some cases for less.

In order to ascertain the amount of rents received for the whole county, I have obtained the rents of each township, by which it appears that the amount of each ward is as follows :—

Darlington Ward	-	-	172,229
Stockton Ward	-	-	100,836
Easington Ward	-	-	106,743
Chester Ward	-	-	196,216
Total			<u>£576,024</u>

SECT. IV.—TITHES.

TITHES are in some places drawn, but in general they are valued and let every year. There are no fixed prices for particular crops, the value per acre varying according to the estimated produce of bushels per acre, and the price it would sell for at market, deducting the expence of collecting, threshing, marketing, taxes, &c.

Tithe lambs are due at midsummer, and wool when severed from the sheep.

Turnip tithe varies from 2s. 6d. to 7s. 6d. per acre.

Potatoe ditto ditto 10s. to 16s. ditto.

SECT. V.—POOR RATES, AND OTHER PAROCHIAL TAXES.

THE poor rates in the large towns, and manufacturing and mining districts, are from 2s. 6d. to 4s. 6d. per pound; in the districts purely agricultural, from 1s. 3d. to 2s. 6d.; but it is difficult to ascertain what poor rates exactly are per pound, as in many places they are collected by old rentals, or rentals reduced one-fourth or one third, or some other aliquot part, below the real rents or value.

The amount of the land-tax for the different wards is as follows:—

		<i>£.</i>	<i>s.</i>	<i>d.</i>
Darlington Ward	-	3016	7	9½
Stockton Ward	- -	2125	10	7½
Easington Ward	- -	1909	19	6½
Chester Ward	- -	2417	6	0
Total		<u>£9469</u>	<u>3</u>	<u>11½</u>

SECT. VI.—LEASES.

THE greatest number of leases in this county are of short endurance—*three, five, and seven* years being the most general terms, and many, tenants at will; a few are let for twelve or fourteen years: where this happens to be the case, considerable improvements are going forward; but those farms let for short terms remain stationary, as no prudent man will lay out his money in improvements, for which, when completed, he will be rewarded by an advance of rent, proportioned to the improvement he has made.

SECT. VII.—EXPENCES AND PROFITS.

FROM the great difference of soils, situation, climate,

seasons, &c. it is a difficult matter to state the expences and profits of a farm, which depend on so many contingent circumstances, that they cannot be ascertained with any degree of certainty, as a general estimate for so large a district. This seems to be the opinion of the most intelligent farmers in the county.

Fig. 1.



Fig. 2.

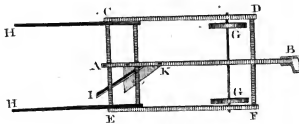
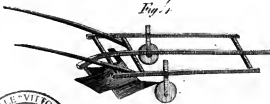


Fig. 3.



Fig. 4.



CHAP. V.

IMPLEMENTS:

SECT. 1.—PLOUGHS.

THE ploughs used in this county are invariably *swing ploughs*; but it does not appear that there ever was any certain or general rule of construction, every one making them according to his own idea, or the fashion of the moment.

It is upwards of forty years since I first knew them, at which period, and for many years afterwards, the mould boards were all made of wood, and very full at the breast; they are now mostly made of cast iron, and rather thinner at the breast than formerly: in the length and height of the beam they vary much, scarcely two carpenters making them alike in this respect, though the most essential parts that require to be properly proportioned, to make the plough go as it should do. Amongst many I have measured, I give the two following. Plate 1, fig. 1.

	1st plough.	2d do.	3d do.
Length from heel to B, or TB	26½	26½	26½
From B to point of yoking H, or HB	-	51	59
Height of the beam HI	-	18½	17½

The numbers in the third column are derived from principles demonstrated in my Essay on the Construction of the Plough on mathematical Principles, from which some practical directions for making one were given in the Northumberland Report.

In an Appendix I shall probably give some further directions, by which carpenters may make ploughs on those principles, and have a certain practical and mechanical rule to direct them.

Upon examining the dimensions of the first plough, by the principles above referred to, it appears that the beam (being $18\frac{1}{2}$ inches high, and HB 51 inches) is too short by $7\frac{1}{2}$ inches; the consequence of which is, that it will run upon the point of the sock, and the heel be raised from the ground, and will go to the depth of 10 inches (before its heel runs level) if not counteracted by lowering the cop, or shortening the back bands, to give the traces a more downward direction.

In the second plough the beam being $17\frac{1}{2}$ inches high, and HB 59 inches, is too long by $1\frac{1}{2}$ inches, and the plough would go only 5 inches deep, unless the cop be raised, or two chains lengthened.

Paring Plough.

At Winyard I saw in 1808, a paring plough of a new construction, by the late Mr Cotesworth, who had the charge of Sir Henry Vane's farming concerns.

Figure 2, plate 1. represents a plan of the frame, &c. and fig. 3 a side view: the particular parts are marked with the same letters in both figures, for the ease of reference.

The beam AB 78 inches long, is fixed to a frame CDEF 63 inches long by 37 broad; in the fore part of this frame are fixed two wheels GG, of 18 inches diameter; HH are the stilts; I the mould board of wood; K the share, a flat triangular piece of iron, 20 inches by 14 (with a steel edge) fixed to the bottom of the plough by two screws in the sole, and one in the mould board; L is a foot placed immediately before the point of the share.

Mr Cotesworth's son informed me that the first plough of this kind was made without the foot, which went very unsteadily; to prevent this, his father added the foot L, which had the desired effect: this foot is put higher or lower by means of wedges. A small wheel, I presume, would answer the same purpose, and be attended with far less friction, and equally regulate the depth to be pared.

Mr Robert Colling has one which instead of having this foot, and the wheels placed on an axle at the fore part of the frame, has two distinct wheels placed in the frame, a little before the point of the share, and which are set higher or lower by wedges, to regulate the thickness to be pared. Figure 4, plate 1.

With this plough an acre a day can be pared from 1 to $1\frac{1}{2}$ inches thick.

SECT. II.—HARROWS.

I find nothing particular in the harrows: they are the same as those generally used in other districts.

SECT. III.—ROLLERS.

THE rollers are generally made of wood—some few of stone, and also of cast iron. I have not observed any fluted or concave, and only a few divided.

SECT. IV.—DRILLS.

I believe it is not more than twenty years since Mr Cook employed Mr Perkins, a carpenter, at Stockton, to dispose of his drills; but those with cups screwed on, not giving satisfaction, Mr Perkins constructed a *five row drill* without cups, by cutting round holes in a cylinder of wood, which being much cheaper than Mr Cook's drill, they were preferred to his. But at present the seven row drill, described in the Northumberland Report, is generally used by the principal farmers and gentlemen most eminent for improved cultivation.

George Baker, Esq. and Mr Robert Colling have each one, to sow *seven, eight, or nine rows*, which it does with the utmost facility upon the most uneven ground. It is this property of the coulter hanging independent of each other, combined with that of sowing all kinds of grain in any quantity, and at any distance of intervals, that has recommended it to the notice, and caused its

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adoption, by the above enlightened and superior class of cultivators.

Bean Drills.

The bean drill formerly used for sowing single rows, was a barrow drill, which a man wheeled before him in the furrow after the plough. It was a fluted cylinder of wood, with a brush at the delivery, which admitted of very little variation of the quantity sown. This has been nearly superseded by the drill described in the Northumberland Report, in the last edition of which I mentioned an improvement of having contrived to hang the drill between two stilts, of which I shall here give a more particular description.

Instead of the landside stilt being fixed to the end of the beam, and the right hand stilt to the mould board, as in common ploughs, in this they are fixed as follows: The beam and body of the plough being made as usual, a strong frame of iron ABCDEF, is fixed upon the beam GH; and upon the parts BC, AD of this frame, are fixed the stilts ID, KC (represented by dotted lines); the drill PNI, is placed in the body of the plough, as represented in the figure, and fixed at the fore end by the iron bar LM, which moves on the bolt at L, and another at M, and at the hind end by the iron bolt and bar NO; a plate of sheet iron GX, is fixed in the same plane, with the landside of the plough, to prevent the clods from falling in and obstructing the wheel W; a plate of sheet iron is also fixed on the mould board side, to remove the earth, and form a narrow furrow for depo-

PLATE III.

Fig 1.^a

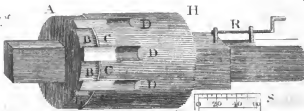


Fig 2

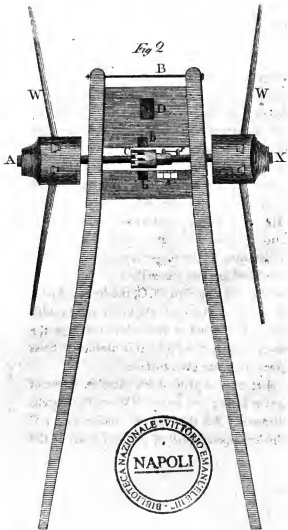


Fig 3



Fig 4



Fig 5



Turnip Drills

Are mostly made with a hollow cylinder of tin, with small holes in them, or that described in the Northumberland Report, with semi-egg cavities in a solid iron cylinder.

Another is now introducing, which I lately constructed, to sow any number of seeds from 5 to 50, or 100, in a foot, with great accuracy.

The principle is the same as that of my corn and bean drill, viz: a brass cylinder of two inches diameter, and two inches long, fixed upon an iron axle of 24 inches long, on the ends of which are fixed two wheels of eight feet circumference (or $30\frac{1}{2}$ inches diameter) the cylinder has eight flutes, two-tenths of an inch wide, and one-tenth deep, including the thickness of the copper.

A hollow cylinder of thin copper H, fig. 1, plate 3, is exactly fitted to slide upon the solid fluted cylinder of brass A, in which are cut eight oblong holes or slits, with pieces DD, turned down at the end, at an angle of 45 degrees, to fit the flutes, and which increases or decreases the cavities, as the copper cylinder is moved backward or forward by the screw R.

To receive these oblong slips CCC, the brass cylinder is cut or filed down to the exact thickness and breadth of the copper at BBB, and a little dove-tailed at the edges, to prevent their rising; by this means the brass and copper parts form one even surface.

Figure 2, plate 3, is a plan of the wooden frame of this drill, drawn from a less scale. WW are the wheels, $30\frac{1}{2}$ inches diameter: AX the axle, 27 inches long; C the fluted cylinder, upon which a piece of brass of the

form fig. 3, is placed directly over the flutes; the ends are sunk level with the wooden frame at bb, and fixed with screw nails; through a hole in this brass the seeds enter the flutes; this hole is made of the form fig. 4, to act at a wide angle on the edges of the flutes, and prevent the seed from bruising; the box containing the seed is placed upon this brass, and fixed to the frame; the coulter, to which is attached the spout of delivery, is fixed in the hole D; and B is a small iron bolt for fixing the rope by which the drill is drawn.

When the hollow cylinder is screwed close up, if the least number of seeds be 5, and when at the greatest extent, the number be 50, then a scale the length the screw moves, is divided from 5 to 50, as in fig. 1. By which the attentive cultivator has it in his power to sow any number of seeds per foot between those two numbers, to suit wet or dry seasons, or finely pulverized, or cloddy lands. Fig. 3, plate 3, represents the form of the flutes.

SECT. V.—THRESHING MILLS.

THE first effectual threshing mill erected in this county, was by Mr Robert Colling, in the year 1795: since which they have made a rapid progress, and are now almost in general use.

At their first introduction several attempts were made to have them on a small scale, to be wrought with men, or with one horse, and to gain an increase of power by the addition of a fly-wheel, &c. These whims and ab-

surdities are now subsided, it being found by experience, that corn could be threshed cheaper by the flail, as a small machine requires nearly the same number of attendants as a large one.

The expence of horses is now become so great, that they should never be used where it can be avoided. Water, when it can be obtained, is certainly the cheapest. Wind, though an uncertain power, is in many instances used; but in this county, where coals are so cheap, and in most cases at no great distance, *steam* is probably the best and most effective power that can be employed, where the farm is sufficiently large to require a powerful machine.

The only instance of one being worked by steam in this county, is at Pallion, where Mr Goodchild added one to an engine of ten horse power, that he had for drawing water out of his limestone quarries, and which he informs me answers very well.

But as it may be useful, I shall state the expence and effect of one erected for the purpose of threshing only, by my neighbour, Mr Thompson, of Chillingham Barns, in 1805, the expence of which was—

	£
For the engine and house - - - - -	325
The threshing part . - - - - -	100
Total expence	425

The drum and rollers are six feet long. It has two rakes, and two winnowing machines. The quantity of coals sufficient to keep the engine going six hours, is from 20

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to 24 bushels: the work performed is from 1,000 to 1,200 sheaves per hour.

It requires one man to attend the engine, in addition to those usually employed where water or wind is the power.

This engine was calculated to be equal to a five horse power, but will do more work than six horses, which requiring a driver, will balance the man attending the engine; and of course the difference of daily expence will be between the value of 24 bushels of coals, and the daily labour of six horses. In this situation 24 bushels of coal cost about ten shillings.

Mr Thompson has threshed four crops with this machine, and has not found it require any expensive repairs, or difficulty in the management.

Waggons.

Waggons are little used for agricultural purposes in this county, and are lessening in number yearly, as carriages of less bulk drawn by four horses are found more advantageous, and are much less destructive to roads.

Carts drawn by two or three horses are most generally used for every purpose of farming: they are of two kinds, viz: long carts, and coups or short carts.

Long carts are used for leading corn, straw, hay, wood, &c.; they are boarded only at the bottom, the sides being formed of upright rungs, placed at about 12 inches distance. The dimensions are—length 8 feet; breadth 3 feet 6 inches; height of the sides 1 foot 8 inches. Plate 4, fig. 1.

The coup cart is boarded on the bottom, sides, and ends, for carrying coals, lime, dung, &c. The usual

dimensions are—length 5 feet 8 inches ; breadth 3 feet 2 inches ; height of the sides 1 foot 6 inches. These are sometimes heightened by a narrow board of 4 or 5 inches, put on the top of the sides, called overings; when these are on, and the load upheaped, they hold 36 bushels of coals or lime.

Single horse carts are a smaller kind of coup, and are becoming more general for carrying articles upon the public roads, especially coals.

I recollect since the coals from the collieries of Railey Fell, Witton Park, West Auckland, &c. for the supply of the North Riding of Yorkshire, were all carried in carts drawn by two or three horses ; but now they are mostly carried in single horse carts, as it is found that two single horse carts will carry as much as a three-horse cart.

The dimensions of the single horse carts are—

		<i>Ft. ins.</i>
Length	- - - -	5 0
Breadth	- - - -	2 10
Depth	- - - -	1 8 with overings.

The shafts are made distinct from the body of the cart, and fixed to it by a long iron bolt (which goes from side to side) about 15 inches before the centre of the axle, the use of which is, that when the cart is turned or couped up, to unload or discharge its contents, it is drawn up again to its right position, when the horse moves forward, by the power of the lever AB between the axle and bolt. Fig. 2, plate 4.

SECT. IX.—RAKES.

THE rakes used here are much the same as those in most other districts; the shank being 6 feet long, and head 2 feet 1 inch; but I have met with a rake drawn by a horse, a contrivance of Mr Robert Colling's, which I believe is little known, and therefore give a drawing of it, as I think it may be applied to many useful purposes, not only for raking stubbles, but also hay, &c.

A drawing of this rake is given in plate 4, fig. 3. The end bar AB to which is fixed the shafts, is 3 feet 9 inches long; the rake CD is $7\frac{1}{2}$ feet long, containing 24 teeth, 15 inches long. These two ends are connected by four bars; the two middle ones five feet long, placed at right angles to the two ends: the two outside ones are placed in an oblique position; the wheels placed in the middle bars are two feet diameter.

Being inclined to think that it would be an improvement to have the wheels attached to the shafts, and the frame with the rake to have no wheels, as the man who has the rake to lift, when the hay is dropped, acts against the power of the horse on the short lever between the bar AB, and the axle of the wheels, unless the horse stops every time the hay is deposited. I had one, made in this way, with the teeth at three inches distance, which were found too close where the hay was thick, as it there frequently got above the hay; but on taking out every other tooth, this defect was remedied, and it collected the hay into rows with great dispatch and facility, but did not rake sufficiently clean; this was accomplished by going over the ground a

second time, with another rake having the teeth three inches distance. Plate 4, fig. 4.

Sowing Troughs.

In this county the corn is mostly sown out of what is called a hopper, of the form represented in fig. 5, plate 4. They are made of straw, in the same manner as bee hives are, and are slung over the neck and shoulder by the band B, and on the opposite side have a crooked handle H, by which the sower supports it.

CHAP. VI.

ENCLOSING.

SECT. I.—CASES BY ACT OF PARLIAMENT.

THE first authentic account I can find of enclosures is of Ryhope, in 1658, and of Stockton Common Fields, in 1659, containing 1765 acres.

For information respecting those of later times, I am greatly indebted to Mr John Bell, of Newcastle, and Mr Daniel Turner, of Bishop Auckland, which I have arranged in the following tabular form.

Account of Commons divided and inclosed in the county of Durham.

Year.	Names of Commons.	By act of Parliament, or agreement.	Quantity.	Lords of Manors, & their compensation.	Remarks.
1756 } 1758 }	Willington and Helme- don Row Braucepeth & Stockley	Act of Parliament Ditto	Acres. Pence. Farthings. 958 2 25 1655 3 27	Farrer Wren, Esq. 1-16th Wm Belasyse, Esq. 1-20th	
1758	Hamsterly	Ditto	8928 2 0	Bishop of Durham 4d per acre per annum *	Mines, &c. with liberty of working, and way- leave reserved to the lord: the damages oc- casioned thereby to be paid by the owners of allotments. †
1758	Ivaley	Agreement	300 0 0		Mines, &c. with liberty of working and way- leave reserved to the Bishop: the damages to be paid by the owners of allotments.
1760	Hunwick Edge	Act of Parliament	949 0 6	Bishop of Durham, 6d per acre per annum	
			12792 0 18		

* Whatever average is paid yearly to the Bishop, the same sum per acre is paid on admittance or alienation of copyhold.

† Wherever mines and quarries are reserved, liberty of working and way-leave is also reserved.

Account of Commons divided and inclosed in the county of Durham.

Year.	Names of Commons.	By act of Parliament, or agreement.	Quantity.	Lords of Manors, & their compensation.	Remarks.
	Brought over		A. R. P. 12792 0 18		
1761 {	Evenwood and West { Auckland	Act of Parliament	2016 3 17	Bishop of Durham, 6d per acre per annum	Mines, &c. with liberty of working and way-leave reserved to the Bishop: the damages to be paid by the owners of allotments.
1762	Ushaw	Ditto	844 0 33	Ditto, 6d per acre, &c.	Ditto
1764	Newbiggen	Agreement	2490 0 0	Earl of Darlington, 1-16th	Mines reserved
1764	Standrop	Act of Parliament	500 0 0	Ditto, 1-16th	Ditto
1764	Crook and Billy Row	Ditto	2179 2 0	Farrer Wren, Esq. 1-16th	Ditto, the lord paying damages for the spoil of ground.
			20816 2 23		

Account of Commons divided and inclosed in the county of Durham.

Year.	Names of Commons.	By act of Parli- ment, or agree- ment.	Quantity.	Lords of Manors, & their compensation.	Remarks.
	Brought over		A. R. P. 20816 2 28		
1765	Wolsingham more improvable less improvable	Act of Parliament - - - - - - - -	4882 0 28 6246 1 18	Bishop of Durham, 4d per acre, &c.	Mines reserved to the Bishop. 21 years were allowed for inclosing the less improvable al- lotments, of which only 139 A. 3 R. 14 P. have been inclosed; the re- mainder has again of course become common, but those who inclosed have no right to stint upon the uninclosed part.
1766	Nether Heworth	Ditto	450 0 0		
1766	Winston	Agreement	170 1 0	Duke of Bridgewater, 1-20th	
1769	Crossgate, Durham	Act of Parliament	200 0 0	Dean and Chapter of Durham, 6d per acre, &c.	
1769	Wolsingham Townfield	Ditto	200 0 0	Bishop of Durham	Mines, &c. reserved : damages paid by the Dean and Chapter. Mines, &c. reserved the same as before the act.
			32965 1 34		

Account of Commons divided and inclosed in the county of Durham.

<i>Year.</i>	<i>Names of Commons.</i>	<i>By act of Parliament, or agreement.</i>	<i>Quantity.</i> <i>A. R. P.</i>	<i>Lords of Manors, &c their compensation.</i>	<i>Remarks.</i>
1769	Brought over Thoruley	Act of Parliament	32965 1 34 600 0 0	Bridget Bolayse, 6d per acre	Mines reserved
1771 {	Witton-le-Wear and { North Bedburn	Ditto	1380 0 6	Bishop of Durham, 6d per acre	Mines reserved: damages paid by the owners of allotments. Timber grown upon copyhold lands exonerated from any payment to the Bishop.
1772	Hamsteels	Ditto	1397 0 18	Ditto, 6d per acre	Ditto: damages paid by owners of allotments.
1772	Elvet, Durham	Ditto	400 0 0	{ Dean and Chapter of Durham, 6d per acre	Mines reserved: damages paid by the Dean and Chapter.
			36742 2 18		

Account of Commons divided and inclosed in the county of Durham.

Year.	Names of commons.	By act of Parliament, or agreement.	Quantity.			Lords of Manors, & their compensation.	Remarks.
			A.	R.	P.		
1773	Brought over		36742	2	18		
	Lauchester	Act of Parliament	12281	2	22	Bishop of Durham, 4d per acre	Mines reserved: damages paid by the owners of allotments. Timber grown on copyhold allotments exonerated from any payment to the Bishop. 21 years allowed for inclosing the less improveable allotments after the execution of the award.
	more improveable	- - -	3835	3	27		
	less improveable sold for expenses	- - -	300	0	0		
1794	Chester-le-Street	Ditto	2726	2	6	Bishop of Durham, 6d per acre	Mines reserved: damages paid by owners of allotments; but if the Bishop let way-leave for any mines not belonging to his see, then he is to pay for spoil of ground. Timber grown upon any allotment exonerated from any payment to the Bishop.
			55886	2	33		

ENCLOSURE OF COMMONS.

Account of Commons divided and inclosed in the county of Durham.

Year.	Names of Commons.	By act of Parliament, or agreement.	Quantity.		Lords of Manors, & their compensation.	Remarks.
			A.	R.		
1794	Brought over Barnard Castle	Act of Parliament	55886	2 33		
1794	Ryton and Crawcrook } Town Fields, &c.	Ditto	4786	0 0	Earl of Darlington, 1-16th	Mines reserved, &c. Coal mines reserved to the same persons as before the division: other royalties to Messrs Wharton and Surtees.
1796	Urpeth	Agreement	700	0 0	{ John Wharton, and Crozier Surtees, Esqrs. no part being stinted pasture, &c.	Mines reserved: damages paid by owners of allotments.
			136	0 25	Bishop of Durham, 6d per acre	Lead mines reserved to the Bishop, without paying damages. Coal, slate, and stone may be wrought by the proprietors in their own allotments, for any purpose whatever. Timber grown on the allotments to belong to the owners thereof.
1799	Weardale stinted moors } and pastures.	Act of Parliament	25,000	0 0	{ Bishop of Durham, no part being stinted pastures	
			86508	3 18		

Account of Commons divided and inclosed in the county of Durham.

Year.	Names of Commons,	By act of Parliament, or agreement.	Quantity.	Lords of Manors, & their compensation.	Remarks.
	Brought over		A. R. P. 86508 3 18		
1800	Tanfield	Act of Parliament	1040 0 0	{ Marquis of Bute, Marquis of Hertford, and the Earl of Dum- fries }	Royalties reserved to Marquises of Bute and Hertford, and the Earl of Windsor, (except coal, which belongs to William Morton Pitt, Esq.) and way-leave for mines under this common, or any other ground, on paying damages to the owners of allotments: the damages by working of coal, to be paid by the owners of allotments not sustaining injury. Waifs, &c. reserved to Sir John Eden, the same as he had a right to in 1719.
			87548 3 18		

Account of Commons divided and inclosed in the county of Durham.

<i>Year.</i>	<i>Names of Commons.</i>	<i>By act of Parliament, or agreement.</i>	<i>Quantity.</i>	<i>Lords of Manors & their compensation.</i>	<i>Remarks.</i>
	Brought over		<i>A.</i> 87548	<i>R.</i> 3	<i>P.</i> 18
1801	{ Blackburn Fell, Kibblesworth, and Beamish and Hedley }	{ Act of Parliament }	2000	{ Sir T. H. Liddell, Bart. lord of Blackburn, 1-16th Ditto, & Sir John Eden, lords of Kibblesworth, 1-16th Ditto & ditto, or one of them, of Hedley and Beamish, 1-16th }	{ Mines and quarries (except coal) under that part called Blackburn Fell with way-leave reserved to the respective Lords, who are to pay damages for the spoil of ground. The coal under Blackburn Fell belongs to the Bishop, but no way-leave. Mines, &c. reserved to the Bishop. One-third of the Bishop's allotment appropriated to found schools in the county of Durham. }
1801	{ Framwellgate, Durham, and Witton Gilbert }	{ Ditto }	2400	0	0
			91948	3	18

Account of Commons divided and inclosed in the county of Durham.

<i>Year.</i>	<i>Names of Commons.</i>	<i>By act of Parliament, or agreement.</i>	<i>Quantity.</i> <i>A. R. P.</i>	<i>Lords of Manors & their compensation.</i>	<i>Remarks.</i>
	Brought over		91948 3 18		
1803	Escomb and Edderley	Act of Parliament	319 2 39	Bishop of Durham, 1-10th	{ Mines, &c. reserved: damages paid by the Bishop.
1803	Beamish South Moor	Ditto	400 0 0		
1804	Byers Green	Ditto	460 0 0	Bishop of Durham, 1-16th	{ Mines, &c. reserved: damages paid by the Bishop.
	Middleton and Eggleston	Ditto	18,000 0 0	Earl of Darlington	
1809	Middlechope	Ditto	2343 0 0	{ Bishop of Durham, no part being a stinted common	{ Mines, &c. reserved, without paying damages for spoil of grounds.
1809	Gateshead	Ditto	600 0 0		
Total divided			114,071 2 17		

The Commons in this county that remain undivided, are

	A.	R.	P.		
Cockfield Fell - - - - -	500	0	0	{ These are all very improveable. The greatest part of them would be good arable land; and they are all situated in populous dis- tricts.	A. 1600 R. 0 P. 0
Gilligate, Durham - - - - -	900	0	0		
Walridge - - - - -	300	0	0		
Barlow - - - - -	200	0	0		
Whickham - - - - -	150	0	0		
Birtley - - - - -	150	0	0	{ Mostly heath; but many parts im- proveable.	A. 17800 R. 0 P. 0
Hedley or Corney - - - - -	800	0	0		
Hinden and Woodlands - - - - -	2000	0	0		
Stanhope and Bollyhope - - - - -	15000	0	0		
Total undivided	19400	0	0		

From the above it appears, that within the last fifty years the division of commons in this county amounts to 114,071 acres: of this quantity a portion has not been thought capable of improvement by ploughing, as we find in Wolsingham the less improveable is stated to be - - - - 6246 acres.
And in Lanchester the less improveable is 3835

Making in these two commons 10,081 acres.

Of the former there has been only 140 acres inclosed; and of the latter for several years after the division, the fee simple of allotments might have been purchased at 14s. an acre; and of late years some have been sold for 20s. an acre, and ploughed and improved, but at an expence that some neighbouring farmers think the land is not capable of repaying.

Upon the division of Hamsterley Common there were 2000 acres which the proprietors did not think worth the Bishop's rent of 4d. per acre, and they were given up to Geo. Surtees, Esq. (one of the principal proprietors) on condition that he paid the Bishop's rent for them.

In the Weardale, Eggleston, and Middleton Commons, a considerable portion is not capable of improvement by the plough, and in all there is probably upwards of 40,000 acres of this description, which taken from the amount of the whole, leaves in round numbers 74,000 acres capable of improvement by the plough, the greater part of which has undergone that operation, and continues in a regular system of cultivation.

The whole is well inclosed, and sub-divided into proper sized fields, by thorn hedges or stone walls; and a

great many new farm houses, offices, &c. have been erected upon every common that has been divided, for the proper occupation thereof.

The effect on produce and population cannot be otherwise than favourable—for supposing 70,000 acres in a rotation of three years grass and three years tillage, there will then be 35,000 acres of grass, which will depasture more than double the stock that the whole 70,000 acres did before inclosure; and there will be 11,666 acres of fallow, part of which will produce turnips or rape, and 23,333 acres of corn. This will certainly augment the produce of the district in a considerable degree, and also the population, as so large a tract of land under cultivation must require a much greater number of hands than when in a state of unproductive common.

I am perfectly at a loss to discover why the Board should enquire how enclosing of commons affects the poor? The *industrious poor* must certainly be benefited by an increase of *employment*, and an increase of *provisions*; and enclosing of commons can only be inimical to vagabonds, sheep thieves, and other pests of society.

The rise of rent depends much on circumstances; as those commons situated in the vicinity of populous districts, as Durham, Chester, Gateshead, &c. will advance in a greater proportion than those which have not such advantages: and upon many commons most of the proprietors received little or no benefit from them. A few years since I valued and let an allotment for 750*l.* for the common right of which before the division, the proprietor and his tenants never received benefits equal to as many shillings.

I knew a great part of these commons in their native state, and think, that upon an average the lands are at least ten times more valuable by enclosure than they were in a state of common.

Fences.

The most general fences are earth mounds, planted with quicks. The usual form, especially on moist soils, is that of fig. 6, plate IV. where the breadth of the gutter AB is $4\frac{1}{2}$ feet; breadth of the foundation BC six feet; and the height CD four feet.

Upon dry soils they are frequently made as in fig. 7, plate IV. The breadth AB of the raised mound is 40 inches; the height 12 inches: a small ditch is cut on each side to make it, and the quicks are planted in the middle. In this mode the land may be ploughed nearly to the mound, and when the thorns are grown a sufficient height, almost close to the hedge.

In the after management of hedges planted in this way, I observed at Chilton one of splashing them, which I do not recollect to have seen elsewhere.

When they are five or six years old, every other stem is cut clean off within two or three inches of the surface, and the remaining ones stripped of their principal branches; then stakes of 30 inches high are driven in at proper distances, and the splashing stems having a slight cut on one side, to make them bend easier, are wound amongst the stakes at an angle of about 25 degrees, and a single edder is wound along the top, to keep the stakes tight. Fig. 8, plate IV.

In this mode the splashed or sloping stems grow in this inclined position, almost equally as well as if they had been left to grow upright. The shoots from the stems that were cut clean away, grow perpendicular on all sides of the sloping stems, and intermingling with their side branches as well as upright shoots, make in a few years a fence almost impenetrable to any kind of stock.

Old thorn hedges have frequently vacancies in them, in which there is a great difficulty of getting quicks to grow. The best means of getting these gaps filled up again with live fence, is splashing and laying down close to the ground, healthy young stems from the adjoining thorns. I observed this practice particularly well done at Mr Baker's, of Elemore, where several of the layers had sent down roots from the surface within the ground, half an inch in diameter, whilst the upper surface was growing stems in the usual way. This was a kind of new creation of living thorns in open spaces, which had been to repair with rails, &c. for generations before.

Walls.

In some parts of the county where the land is too bad to grow thorns, or the climate too high, stone walls are used for fences. The usual dimensions are—width at bottom 2 feet 4 inches; top 1 foot 4 inches; height 4½ feet; and an edge coping of 9 inches, making the height in all 5 feet 3 inches.

The expence of getting and walling the stones is 7s.

Fig. 1



Fig. 2



Fig. 3





per rood of seven yards ; the expence of leading depends on the distance ; and on an average may be taken the same as the winning and walling, making the whole expence per rood about 14s.

CHAP. VII.

ARABLE LANDS,

SECT. I.—TILLAGE.

IT is generally admitted that the greater the quantity of surface exposed to the influence of the atmosphere, the more the soil is benefited : to obtain this, it is necessary that the furrow slices should lie one upon another, at an angle of 45 degrees ; * and to do this with a furrow of nine inches broad, will require the depth to be six inches : of this depth I am afraid a great many of the farmers of the county of Durham cannot avail themselves, and are obliged to plough their land thinner, for want of more depth of soil. Where it will admit of it, the usual depth of ploughing is from five to six inches, and the farmers being expert ploughmen, this work is generally well executed.

It was formerly the practice in this district, not to plough any kind of stubble land before winter, for spring corn ; but grass land was mostly ploughed before, or during winter, to pulverize by the frost ; and what was

* See my Essay on the Construction of the Plough,

intended for fallow, was very often not ploughed before May. But for several years back, the prevailing practice has been, to plough as much as possible before winter, not only for spring sowing, but also for the summer fallows. These are ploughed at least four times through the summer, for the purpose not only of pulverizing the soil, but also of destroying quickens and other pernicious weeds.

Dry soils, intended for turnips, are repeatedly harrowed and rolled, to reduce them to as fine a state as they can possibly be brought previous to sowing. But upon clay soils this is not practised, as it is thought an advantage to the wheat crop to have them cloddy and rough.

Ridges.

The ridges are of various sizes: on the deep soiled lands they are broad, crooked, and high; but the greater part of the soil of this district being very thin, the ridges are obliged to be small—in many places from seven to nine feet; and even with these narrow ridges every furrow is down to the clay, and that clay of an ochrey bad quality, so inimical to vegetation, that scarcely any plant will grow in it; and narrow ridges upon such soils have been adopted through necessity. But some principal farmers even upon the best soils, have of late years reduced the size of their ridges. Mr Robert Colling, I believe, was the first who attempted to reduce his crooked broad ridges into straight narrow ones. The usual breadth is from seven to nine feet.

The breadth of ridges is of very material consequence

in agriculture, and particularly in this county, where so great a part is a clayey sub-soil. Where the ridges are broad, the water hangs so continually on the sides, as to occasion a great part of the wheat to perish through the winter; and the little that survives, is weak in the straw, with small heads; there being nothing so prejudicial to wheat, as lying wet in winter. This defect is prevented on wet lands, by making the ridges narrow, and the water furrows deep: narrow ridges have also another advantage, in being soon dry, and in a proper state for sowing; and they can be harrowed, by the horses going up each furrow, to prevent their poaching the land, and leaving foot holes as receptacles for water through the winter, which must inevitably be the case on broad ridges.

Drilling.

Drilling is practised by most of the principal farmers. The mode of setting out the ridges, and other practical operations, are performed in the same manner as described in the Northumberland Report, to which I beg leave to refer.

The ridges are of various breadths, according to the number of rows sown upon a ridge, and width of interval between the rows.

Upon moist soils, where it is necessary to make the ridges narrow, a seven row drill is used.

If the intervals are 9 inches, the width of the ridge			
will be	-	-	6 ft. 0 ins.
If the intervals are 10½ ins. the width is			
			6 9
If - - - - 12 - - - -			
			7 6

Upon ridges of 7 feet 6 inches, George Baker, Esq. and Mr Robert Colling have drills that sow nine rows at nine inches intervals, and eight rows at 10½ inches intervals, and seven rows at 12 inches intervals.

Upon soils adapted for beans, a ridge of 7½ feet wide is proper for drilling three rows at thirty inches intervals; and is probably the most convenient breadth of any other for drills of the same construction as those of Mr Baker and Mr Colling.

One of the principal advantages of drilling is the great facility it affords of extirpating annual weeds, which the old arable lands of this county produce in great abundance; and its adoption is probably more owing to the hopes of effecting this object, than to any other, as it is well known that land overrun with weeds cannot produce abundant crops of corn.

When Mr Bamlet entered to Haverton Hill Farm, the way-going crop was overrun with wild oats, runch, and other weeds, * which rendered it so bad, it was given to the labourers for cutting it. By drilling all his crops for eleven years, he has effectually destroyed the wild oats, &c. and the land now produces as abundant crops as any in the county. Mr Baker, Mr Colling, Mr Mason, Messrs Taylors, and others, who pursue this mode

* Corn Ranunculus. Shepherd's Needle. Corn Veronica.

of culture, find the same advantages; and wherever the practice is properly pursued, it has always been found that annual weeds of every description have been perfectly extirpated: and this effect is probably one of the greatest and principal merits of drilling.

SECT. II.—FALLOWING.

How long fallowing has been practised in this county, I have not been able to ascertain; but it is certainly a very ancient custom, and most probably originated under the common field system, as it did in many other parts of the kingdom.

It has been disputed, Whether fallowing was necessary to the fertility of land, or not? The difference of opinion, I am inclined to think, is in a great measure owing to the idea annexed to the term, or to some small remains of prejudice for ancient customs: as before the introduction of turnips, it was thought absolutely necessary to summer-fallow the dry soils as well as the wet, under the idea of *renewing their fertility by a naked summer fallow, or year of rest*; but experience has proved, that the dry soils can bear a crop of turnips of considerable value, and after that a crop of wheat, equal, if *not superior*, to what it would have been from a naked summer fallow, and the land left in an equal state of fertility. It therefore appears, that in this case the land has

received no injury by not being left naked or uncovered by the turnips. The restorative fertility must therefore be owing to another cause, which is common to both modes, and may probably be—sufficient ploughings; clearing of pernicious weeds; and proper manures.

Upon strong loams it has been found, that if beans are drilled at thirty inches intervals, and properly hand-hoed amongst the stems, and horse-hoed or ploughed between the rows, that the land may be left as clear of weeds, and the crop of wheat succeeding the beans be equally good as one obtained after naked fallow.

We also find that upon wet soils, instead of a naked summer fallow, if the land be sown with rape the beginning of June, after three or four ploughings, and the rape eaten off with sheep in September or October, and the land then ploughed and sown with wheat, the crop will be better than if the land had remained a naked summer fallow.

From these instances, it appears that it is not necessary to the fertility of land, to let it lie in a naked or uncovered state through the summer; but that it is necessary to keep it clear of weeds, and in a duly pulverized state, supposing the manures in both cases to be equally the same.

But there are many parts of this county where the soils are moist thin loams, upon ochrey clay, that are so addicted to the production of *Agrostis Nigra*, *Alba*, and *Stolonifera*, that it is scarcely possible to effect their destruction without a naked summer fallow, at least in their present state; but it is probable that superior cultivation may remove the necessity of having recourse to this measure so often as has been the prevailing practice.

SECT. III.—COURSE OF CROPS.

SINCE I recollect the agricultural practice of this county, the general system was—

1 Fallow	or 1 Fallow	or 1 Fallow
2 Wheat	2 Wheat	2 Wheat
3 Oats	3 Pease	3 Beans
4 Fallow	4 Oats	4 Fallow
	5 Fallow	

At that period the absurd custom of confining the tenants to lay *all their dung* upon the old meadow grounds, was very prevalent, which prevented turnips being grown upon the fallows of the old arable lands; and the few turnips that were grown, were mostly upon pared and burned land; and the rotation—

- 1 Turnips
- 2 Barley
- 3 Oats
- 4 Fallow, limed
- 5 Wheat
- 6 Oats

7 Fallow, limed for four or five or more rotations, by which the land was exhausted, and paring and burning blamed as the cause, when the effect was produced by too long a repetition of corn crops, with constant liming and no manure. I have known even four or five white crops taken in succession, after paring and

burning ; but these ruinous practices have given way to more rational systems, which were first introduced by the occupiers of large farms, and by degrees have been adopted by their neighbours.

Upon dry soils the rotations at present are—

- 1 Turnips
- 2 Barley or Wheat
- 3 Clover, for one or two years
- 4 Oats, or where barley has been grown after turnips, wheat is sometimes sown

Upon strong loams :—

- 1 Fallow
- 2 Wheat
- 3 Clover for one or two years
- 4 Beans or Oats

Upon moist thin loams or ochrey clay :—

- 1 Fallow
- 2 Wheat
- 3 Clover and Grass Seeds for two years
- 4 Oats

Upon moory soils :—

- 1 Fallow
- 2 Oats
- 3 Clover and Grass Seeds for two years
- 4 Oats

SECT. IV.—WHEAT.

THE preparation for wheat in this county, upon soils improper for turnips, is mostly by a naked summer fallow. Sometimes rape is sown upon moist soils, and eaten off by sheep in September; a small portion is also sown after drilled beans; the land, after the beans are carried, being first horse-hoed, and then ploughed into proper sized ridges. There is also a small quantity of wheat sown upon clover lea, with one ploughing.

The manure raised upon farms of clay soil, is in general applied to the wheat crop, and put on before the last ploughing; but where there are portions of turnip land, the wheat crop receives only what has been spared from the turnips; and what was not dunged, *used* to be limed with two cart loads an acre: but liming is now mostly laid aside upon *old arable lands*, being found of no use, and of course a great portion of wheat is sown without either dung or lime, or any kind of manure whatever. To preserve such lands in a state of fertility, the clover should always be depastured with sheep, never mown; mowing only the clovers raised on lands that have been manured.

The seed is universally endeavoured to be obtained of the best quality; and it has long been a practice to change the seed, by getting it from some other part at a distance, or from a different kind of soil. But seed from the southern counties is generally preferred; and for this purpose considerable quantities are imported every year.

The quantity sown is from 2 to 2½ bushels per acre ; a larger portion is required in spring than in autumn.

Steeping the seed before sowing is now almost a general practice. Chamberlye is generally used for this purpose. Some use sea water ; others, water with so much salt dissolved in it, that it will swim an egg. Which ever is used, the light grains that swim at the top are carefully skimmed off. After the wheat is taken out of the liquid, it is powdered and worked up with quick lime, * to make it sufficiently dry for sowing.

Sorts of Wheat..

The different sorts of wheat grown in this county, are as follows :

White Wheats..

Downy Kent
Golden Kent
Little Wheat
White Flanders or Zealand
Cape Wheat
Hedge Wheat
And Creeping Wheat

* Some people think that quick lime is of use in preventing the smut ; but from experiments I made and recorded in the Northumberland Report, it seems not to be the case.

Red Wheats.

Long Eared Red
Baker's Brown
Creeping Red
Norfolk Red
Hertfordshire Red

Mr Seymour grows the long-eared red wheat, and Baker's brown, and says the produce of those red wheats exceeds the white wheats four or five bushels per acre, grown upon fallows without dung or lime. He uses no lime now, except for wheat sown in the spring, which he thinks makes it tiller more upon *good dry land*; but upon cold late soils does not use lime, as it makes the wheat a fortnight later in ripening.

Mr Buston, of Long Newton, says, that long-eared red wheat is most proper for the clay soils in that neighbourhood, as it produces about one-fifth per acre more than white wheat.

At the request of the Rusheyford Society, Mr Robert Colling made the following experiment.

Experiment 1st. on Wheat. By Mr Robert Colling. -1805.

Kinds of Wheat.	Bushels sown per acre.		Weights per Bushel.		When sown.	When reaped.	Stalks per acre.	Market Corn.		Light Corn.		Total.	
								Bush.	Wt.	Bush.	Wt.	Bush.	Wt.
Long-eared red	2	4	10½	lb.	1804. Nov. 7.	1805. Sept. 11.	47	35½	2130	1	28	36½	2158
Hedge white	2	4	14	lb.	Nov. 7.	Sept. 10.	37½	25½	1530	1½	40	27	1570

The soil a good strong loamy clay, manured for turnips in 1803, sown with beans the spring following, and the wheat after the beans in the autumn. The Wheat was much lodged.

ROBERT COLLING.

In this experiment the produce of the long-eared red is 10 bushels per acre more than the hedge white. The weight per bushel in both 60 lbs.

Drilling wheat has been practised for several years by the best cultivators; and is now becoming more general.

Mr Robert Colling, of Barmpton, drills nine rows upon 7 feet 3 inches ridges, at 9 inches intervals, at the rate of 2 bushels per acre.

Mr Mason, of Chilton, drills 7 rows upon dry lands, at the rate of 2 bushels per acre.

Mr Taylor, of St Helen's Auckland, drills 7 rows upon 6 feet 2 inches ridges, at the rate of 2 bushels per acre.

The above modes seem to be the general practice: the ridges are set out, and other operations performed, as described in the Northumberland Report.

I have been favoured with the following experiments, to ascertain the comparative merits between drilled and broad-cast wheat.

*Experiment on drilled and broadcast Wheat, by J. D. Nesham, Esq. in 1805,
For the Ruskyford Society.*

Kind of Wheat.	Bushels per acre sown.	Weight per Bushel.	when sown.	when reaped.	Market Corn.		Light Corn.		Total.
					Bushels.	Wt. p. B.	Bushels.	Wt.	
<i>Hedge White.</i> Drilled Broadcast		lbs.	1805.	1805.	B.	lbs.		lbs.	
	2	59	Feb. 25.	Sept. 24.	30½	57¼	1½		31½
	2	59	Ditto	Ditto 21.	28½	59¼	2¼	57½	30½
<i>Baker's Brown.</i> Drilled Broadcast									
	2	56	Ditto	Sept. 24.	30	59½	1		31
	2	56	Ditto	Ditto	28	59½	1		29

The soil on which this experiment was made, is a good loam; and the course of crops was—1803. Oats : a great crop on rift, after having been 30 years in grass. 1804. Turnips drilled, three times horse-hoed, and 2½ loads of fold yard dung per acre. The turnips all led off.

1805. Wheat : the whole was partially rusted.*

CHRIS. MASON, *Visitor.*

* Fungused straw.

Mr Watson, of Middleton, near Wooller, in Northumberland, has also favoured me with a letter on this subject, of which the following is an extract:—

“ In 1803, I marked off three contiguous ridges, which had been cultivated for a series of years in precisely the same manner, and which were perfectly alike in soil, exposure, condition, &c. &c. for the purpose of making an accurate comparative experiment. On the 10th February these ridges were all sown with white wheat (of the same variety) which had been thoroughly mixed, and then pickled in the usual manner, with old chamberlye and quick lime. One was sown broadcast, at the rate of three Winchester bushels per acre; one in the drill mode (by a machine of your construction) at intervals of nine inches; and the other, in the same mode of culture, with intervals of $10\frac{1}{2}$ inches. The two latter ridges received about $2\frac{1}{2}$ Winchester bushels of seed per acre. Each drilled ridge was once hand-hoed; and at harvest the crop upon the whole experimental ground was cut at the same time, with the greatest exactness—and immediately after cutting, the sheaves upon each ridge were counted: after standing four days of dry weather in stooks, they were separately and exactly threshed. The produce was as under:—

The broad-cast ridge, at the rate of 34 Winchester bushels per acre. Weight 58 lbs. per bushel.

Drilled ditto, at $10\frac{1}{2}$ inches intervals, 33 $\frac{1}{2}$ ditto ditto.

Ditto 58 ditto.

Ditto ditto, at 9 ditto, 36 ditto ditto. Ditto 59 ditto.

The straw was all weighed very exactly: the quantity

per acre was nearly equal upon the broad-cast ridge and that with the $10\frac{1}{2}$ inches intervals; that upon the ridge with 9 inches intervals, was considerably the greatest.

“ In another year I made a similar experiment, upon three adjoining ridges of rather light gravelly soil, equally as proper as those above for the purpose of comparative experiment. In the year preceding they produced a crop of turnips, upon which sheep were folded. The land was sown in a perfectly clean state (with white wheat) in the first week of March, as in the above experiment; the crop was neither hand nor horse-hoed: the produce was as follows:—

Broad-cast ridge, at the rate of 40 Winchester bushels per acre. Weight 59 lbs. per bushel.

Drilled ridge, at $10\frac{1}{2}$ inches intervals, 40 ditto ditto.

Ditto 59 lbs. ditto.

Ditto, at 9 inches ditto, $42\frac{1}{2}$ ditto ditto. Ditto 60 lbs. ditto.

“ In this experiment the straw was weighed. The result the same very nearly as in the first trial.

“ Though the above results are favourable to the drilling of corn, yet they almost induce me to be a sceptic, when I perceive some account of the experiments of some reverend and great advocates (in the southern counties) for that mode of cultivation. Some of these gentlemen have not, I think, been sufficiently particular in describing the state of their land: mine was perfectly clean, and free from root and almost all other weeds. If theirs was foul, the great difference which they state in favour of the row culture, is in some measure accounted for. It is almost unnecessary to say, that I here allude

to the cleaning of the drilled crops by the horse and hand-hoes : but why sow corn upon land in a foul state ?

“ Notwithstanding the advantages (presented by the above experiments) of intervals of nine inches in the *spring* cultivation of *light lands*, I should be inclined to prefer a distance of rows of about twelve inches upon more strong, deep, and fertile soils, particularly in early autumnal sowing.”

Messrs Taylor, in two experiments made on ridges, sown alternately by drill and broad-cast, did not find any difference in the produce.

Dibbling can scarcely be said to be a practice of this county ; and from the result of some experiments that have been made, will most probably make little progress. One of them made with great accuracy by Mr Mason, of Chilton, it may be proper to record.

In 1802, Mr Mason drilled at $10\frac{1}{2}$ inches intervals ; dibbled at 2 inches by 4, and sowed some broad-cast. The produce of the drilled exceeded the dibbled more than 2 bushels per acre ; and the dibbled exceeded the broad-cast $3\frac{1}{2}$ bushels per acre.

Water furrrowing upon such wet soils as the greater part of this county consists of, is absolutely necessary, and of course is universally practised, except upon very dry lands, where it is considered of no use, but rather detrimental, as it removes the seed out of the furrow, where it would grow well, and crowds it too much on the sides of the ridge.

Hoeing broad-cast crops is scarcely, if at all, used ; but drilled crops are always hoed, either by hand-hoes or horse-hoes, and often by both. Instead of hoeing broad-cast crops, hand-weeding, or pulling up weeds by little

pickers, is very generally practised, and provincially called "*looking*."

Feeding wheat with sheep in the spring, is a very old, and was almost a general practice, but of late years has been much discontinued; and some principal farmers, (particularly Arthur Mowbray, Esq. of Sherburn House) think it very injurious.

Reaping. Wheat is generally cut by the sickle, and bound up into moderate sized sheaves; then set up in stooks of 12 sheaves each. It was formerly the practice to cover the top with two sheaves, called "*hood sheaves*," set on in a slanting position, for the rain to run down the sloping straws, and keep the sheaves under them dry in moderate rains; but of late years the hood sheaves have been disused, it being found from repeated experience, that in wet weather the corn is much more apt to sprout or grow in the hood-sheaves, than when the stook remains uncovered.

The distempers of mildew, smut, burnt, red gum, cockle eared, and root fallen, are all known here more or less; but under the name mildew, seems to be confounded at *least* two different disorders, viz:—abortive ears, and diseased or fungused straw, known here by the name of "*rust*."

The first may be owing to different causes, arising from different states of the atmosphere, preventing a proper impregnation of the pistil by the farina of the stamens: there is also another cause of abortion, arising from a small fly depositing its eggs in the bottom of the calyx or husk, while in a flowering state, which in a few days become small yellow maggots, from two to six or seven

in a husk, which soon devour the germ or embryo grain. This is generally attended by a red or orange powder on the husk, and is most prevalent in a hot sultry close state of the weather. *

The rust, or fungused straw, is a disease from which great losses are sustained, and is most prevalent in great crops; and especially when wet close warm weather succeeds the blooming season: it is more or less felt almost every year, but wet summers are always the worst.

Smut is not so prevalent as formerly, since the effects of pickling became better understood. I recollect when the practice was to pour chamberlye upon it, so as to make it sufficiently moist for covering the grains with a coat of quick lime; but for several years back *immersion* for about ten minutes has become more general; and when this is properly practised, it is almost a certain antidote against smut.

In the Northumberland Report I mentioned some experiments I had made, to ascertain this point; and am now happy to add some I have been favoured with by Mr William Watson, of North Middleton, near Wooler, which I take the liberty of introducing here, though not made in the county of Durham.

“ A great diversity of opinion has long existed, in
“ various parts of the kingdom, relative to the utility
“ of pickling seed wheat, and some warm disputes hav-
“ ing been maintained upon this intricate subject, in
“ several agricultural publications, where some theorists
“ have warmly opposed and ridiculed some of my

* As was the case, 1808.

“ brethren of the plough, I determined to make some
“ comparative experiments, with accuracy, for my own
“ satisfaction, by dibbling differently prepared seed in
“ different rows : accordingly in 1806, I made choice
“ of some very pure clean wheat, which had not the
“ smallest appearance of smut or infection ; I blackened
“ a part of it with the powder of smut-balls, in which
“ state it remained upwards of twelve hours. It was
“ then used, in various modes, as shewn in the follow-
“ ing synopsis :—

Synopsis of Experiments on pickling Seed Wheat.

No	Quality of Seed.	Preparation.	No. of ears in each row.	No. of ears smutted.	Proportion in 100 ears.
1	Pure, or unblackened	Without any washing or preparation	314	None	
2	Ditto	Ditto ditto, in another row	188	Ditto	
3	Ditto	Pickled with chamberlye and lime	231	Ditto	
4	Ditto	Ditto, with chamberlye only	217	Ditto	
5	Ditto	Ditto, with salt water and lime	243	Ditto	
6	Ditto	Ditto, with salt water only	250	Ditto	
7	Ditto	Washed with common water only	250	Ditto	56
8	Blackened Seed	Without any pickling or preparation	247	140	46
9	Ditto	Ditto ditto, another row	196	90	84
10	Ditto	Pickled with salt water and lime	281	24	7
11	Ditto	Ditto, with common water and lime	314	22	24
12	Ditto	Ditto, with chamberlye and lime	203	5	24

“ It will be necessary to remark, that as the quality only, of the produce, was the object in view, the number of grains dibbled into each row varied greatly—hence the difference in the number produced.

“ The results seem most favourable to the common practice of preparing seed wheat with old chamberlye and quick lime: they also have a tendency to establish the opinion, that smut is not occasioned by atmospheric influence, but by *infected seed*. I understand, however, that many philosophers entertain opinions very different from these. I hope their ingenuity in accounting for the baneful disease in question, and its various phenomena, will not induce the cultivators of the soil to abandon facts, and the judicious practice of pickling.”

From the above experiment, it appears, that the blackened seed sown without pickling or washing, had 56 smutted ears per 100, in one instance, and 46 in the other: the average may be taken at 50.

The blackened seed, pickled with salt water, and with common water, had about 8 smutted ears per 100; and when pickled with chamberlye, only $2\frac{1}{2}$ per 100: which gives a decided preference to pickling with chamberlye.

By experiment. 11th, it also appears that even washing in common water only, is of considerable service.

Burnt, red gum, and cockle eared, are seen occasionally, but considered of little detriment: *root fallen* is more prevalent, especially upon exhausted poor soils.

Stacking. Every species of grain is stacked at the door, either in round or oblong stacks; and there are probably few districts where the operation is better performed, or with more precision and neatness.

Threshing is now mostly done by machines : where threshed by the flail, the prices are—

For Wheat, 9d. per bushel.

Barley, 4½d. ditto.

Oats, 8d. ditto.

Stubbles are in general cut very high by the sickle, and not mown afterwards, by which a great loss of manure is occasioned : it is both a very slovenly, and very wasteful practice.

SECT. V.—RYE.

RYE is very rarely grown alone, as the portion of sandy soils proper for this grain, is very small ; but a mixture of rye and wheat, provincially *maslin*, is very generally grown instead of wheat, and a greater breadth of fallow land covered with it yearly, than with that grain. It is mixed in all proportions from one-eighth of wheat, to seven-eighths of rye ; and from one-eighth of rye, to seven-eighths of wheat, according as the grower thinks the ratio will best suit his soil. It has been long remarked, that the individual grains of each species are plumper and better perfected, than when grown separately ; and that a bushel of good maslin weighs more than a bushel of either good wheat or good rye.

The preparation for it, the quantity of seed sown, and every other operation, is the same as for wheat

The bread made of maslin, is the general bread of the county. It is mostly leavened, and baked in large loaves called brown bread; when leavened, and baked in cakes of about an inch thick, called sour cakes. It is sometimes made into thin unleavened cakes, called tharf cakes; but this species of bread is not reckoned so economical as the soured or leavened bread; in all these forms it is used with the bran in it.

When the bran is taken out by a hair temse, the flour raised with yeast, made into large loaves, and baked in the oven, the bread is thought by many to be superior for household bread to that made of pure wheat, as it does not get dry so soon; the rye keeping it juicy much longer than if made without it.

SECT. VI.—BARLEY.

THE tillage for barley after turnips, is mostly one ploughing: some of the best cultivators plough twice: harrowing and rolling succeeds, to get the soil pulverized for the reception of the clover and grass seeds.

I have seen summer fallows on clayey soils, ploughed into narrow ridges in the autumn, left unharrowed through winter, and sown with barley in the spring, without any more ploughing. The crop of barley, and succeeding crop of clover both very good.

Drilling barley is practised by all those who drill wheat, at intervals from nine to twelve inches.

The time of sowing is most generally in April and the beginning of May ; sometimes as late as the middle of May.

The sorts are, the red ribbed barley, the yellow ribbed, and battledore or sprat barley.

The seed is from 2 bushels to $2\frac{1}{2}$ bushels per acre ; the depth where sown broad cast must vary from three inches to half an inch and less ; where drilled, the depth will be about two inches.

The produce upon good lands from 30 to 50 bushels ; and upon lands of inferior quality from 15 to 30.

Barley is cut both by the sickle and the scythe : when by the former, the sheaves are bound up rather loosely, near the top, and set up singly* until dry, when they are bound near the bottom like wheat, and sometimes set up in stooks of 8 or 10 sheaves ; but more generally carried to the stack-yard as soon as bound, without being set up in stooks.

When mown, it lies a few days upon the ground, to wither and dry ; it is then bound into sheaves, and set up in stooks. Mr Seymour, of Woodhouse Close, says, that mowing barley is cheaper than cutting with the sickle, by three shillings an acre.

Mr Colling also informs me, that by mowing, one-third of the expence is saved, and less waste of grain, by at least two bushels per acre. The stubbles, where mown, are raked after the corn is carried.

The straw is used as fodder for cattle, and the grain chiefly malted : a small portion is shelled for pot barley :

* Provincially "gateings."

little or none is used for bread, except what the millers clandestinely grind with wheat, or mix with oat-meal. When wheat is above ten shillings a bushel, the labourers buy barley to mix with wheat, for bread.

SECT. VII.—OATS.

THE tillage for oats is only one ploughing, performed mostly before winter, especially when old grass lands are broken up; there is no previous harrowing, rolling, scarifying, or manuring before sowing. Where lands have been ploughed before winter, the seed is sown upon the land as the plough left it; but where land is sown soon after ploughing, it is necessary to give it a single with the harrows, to harrow down a little soil into the hollows formed by the furrow slices, to prevent the seed from falling through between them, and being buried too deep to vegetate. They are chiefly sown broad-cast, very few being drilled, * and none dibbled.

The time of sowing is from the beginning of February to the beginning of May; but the most general and most desirable seed time, is the month of March, and beginning of April: what are sown the latter end of April and beginning of May, are in cases of necessity; and then always early oats are sown.

* I observed some oats remarkably well drilled at George Baker's, Esq. Elemore. Mr Mason and Mr Bamlet also drill oats.

The different varieties of oats cultivated here, may be divided into two kinds, viz :—the early and the late oats.

The early Oats

Are the Potatoe, Poland, Friezland or Dutch.

The late Oats

Are the Angus, the common oat, and the Tartarian. The Angus may be said to hold a middle station with respect to lateness of ripening.

The quantity of seed sown per acre is from 3 to 4 bushels of Potatoe, Friezland, and common oats; of Angus and Tartarian, about 5 bushels; and of Poland 6 bushels per acre.

The produce varies in proportion to the soil, and state of fertility it is in for producing crops. The early oats are sown upon lands considered to be in good condition, and the best cultivators upon such soils have from 40 to 50 bushels on an average; in particular cases 60 bushels: and upon lands of less value, from 30 to 40 bushels per acre.

The common oat has been cultivated here from time immemorial, and is now mostly sown upon lands of an inferior quality. The average is from 20 to 30 bushels per acre; but upon a large portion of the poor thin clay soils, on the east side of the county, and the moor soils on the west, they very often do not exceed 14 or 16 bushels per acre.

The Angus oat was first introduced into this district about twelve years since, and is deservedly a great favour-

ite, as it is found upon some soils to be more productive than the early kinds.

Tartarian oats were cultivated here upwards of thirty years since, but were given up on account of the inferior price they brought at market, without considering what they wanted in price per bushel, might be made up by the superior quantity; and their growth was abandoned most probably for want of experimental trials in comparison with other kinds, to ascertain which gave the greatest produce per acre on the same soil: of late years this has been done, and they are now grown in those parts of the county which are not thought proper for the early kinds of oats.

Messrs Buston, of Longnewton, get 5 bushels per acre more of these, than they do of any other; but they sell at 9d. per bushel less than potatoe oats, and 3d. per bushel less than common oats.

In order to ascertain the produce from different kinds of oats, the Rusheyford Society instituted a set of experiments, which they have obligingly enabled me to lay before the public.

1803. *Experiment 1st, on Oats, by Mr George Taylor.*

Kind of Grain.	Bushels sown per Acre.	Weight per Bushel.	when reaped	Marketable Corn.		Light Corn.		Total Bush- els.	Total Wt.	Wt. per Bush.
				Bushels.	Weight. lbs.	Bushels.	Wt. lbs.			
Tartary Oats	4	34½	Oct. 4.	50	1500	2	52	52	1552	30¼
Angus Oats	4	42½	Sept. 12.	32	1092	11	215	43	1307	34¼
Potatoe Oats	4	41½	Sept. 1.	24	885	12	337	36	1222	36¼

‘The potatoe oats are entered here for the convenience of expressing as nearly as may be, the result : but this cannot be depended upon, as six pigs were amongst the sheaves for about five minutes, eating without either weight or measure. The land on which this experiment was made, is a clayey loam, inclining towards the south east ; worth about 17s. per acre (tithe free) ; and at seed time was clean, and in good tilth.

‘WILLIAM TAYLOR,’ }
 ‘LUKE SEYMOUR,’ } *Visitors.*

By this experiment it appears that the Tartary and Angus oats are much better adapted to poor clayey soils, than the Potatoe oat.

1803. Experiment 2nd, by John Netham, Esq. at Houghton-le-Spring.

Kind of Oats.	Bushels sown per acre.	Weight per Bushel.	taken sown.	when reaped.	Marketable Corn.		Light Corn. small, rough light	Total Bush- els.	Wt. per Bush.
					Bushels.				
Tartary	4	36	April 21.	Sept. 23.	88		2	4	94
Angus	4	37½	April 21.	Sept. 16.	70		0	4	74
Potatoe	4	41½	April 21.	Sept. 8.	62		1	8	71
									42

‘ These were after turnips, which had been highly manured : soil, a rich loam. •
 ‘ The potatoe oats suffered considerably from the sparrows. The land clean and in-
 ‘ fine condition at seed time.

‘ J CLARKE, }
 ‘ ROBERT WHITE, } *Visitors.*

Experiment 3rd, by J. Nesham, Esq.

Kind of Oats.	Bushels sown per acre.	Weight per Bushel.	when sown	when reaped	Marketable Corn.		Light Corn.		Total Bushels.	Total Weight lbs.	Weight per Bushel.
					Bushels.	Weight.	Bushels.	Weight.			
Friezland	4	42	April 2.	Aug. 31.	67½	39½	5½	35	72½	2818½	39½
Angus	4	41½	April 2.	Sept. 13.	73	36½	6½	32	79½	2842½	36½
Potatoe	4	43	April 2.	Sept. 6.	73	41½	1½	36	74½	3070½	41½

These were after the second year's clover and ray grass. The second year eaten by sheep. The first year mown for hay. In 1801, the part on which the Friezland oats grew, was spring wheat: the rest barley. In 180½, drilled turnips led off. In 1799 oats, after being ploughed out from grass of more than 40 years standing.

‘ J. BECKWORTH, ’ }
‘ R. WHITE, ’ } *Visitors.*

1804. Experiment 4th, by Mr George Taylor, of St Helen, Auckland.

Kind of Oats.	Bush. sown p. acre.	Wt. per Bush.	when sown.	when reaped.	Marketable Corn.		Light Corn.		Total.		Weight per Bushel.	Wt. of W't. do. 100 parts of ditto, kiln dried. Shelled grain contain W't. of meal	
					Bushels.	Weight. lbs.	Bush.	Wt.	Bush.	Wt.		lbs. oz.	lbs. oz.
Tartary	4	32 2	April 17	Sept. 21	60	1927	20	507	80	2434	32 2	17 4	53 6
Angus	4	37 14	17	14	68	2482	5	159	73	2641	36	8 32	5 20 7 55 9
Potatoe	4	42 8	17	5	59	2404	4	91	63	2495	40	12 36	10 24 15 61 1
Friezland	4	42 8	17	3	41	1634	6	188	47	1822	39	14 34	10 21 5 53 4
Red	4	40 12	17	3	45	1639	5	157	50	1790	36	6 32	12 21 15 60 3

‘ The soil a strong gravel, worth about thirty shillings
 ‘ an acre rent : had borne the preceding year a heavy
 ‘ crop of clover hay, of the first year’s growth. The ac-
 ‘ count of straw is omitted, from a conviction of there be-
 ‘ ing no conclusion to be drawn from quantities so uncer-
 ‘ tain as what are called folds of straw. Perhaps the
 ‘ same observation may apply to stooks. The quantity
 ‘ of land required for each kind was so considerable, that
 ‘ the quality could not be obtained perfectly equal ; and
 ‘ the Friezland and the Red Oat grew on land worth 5s.
 ‘ an acre less than that on which the other kinds grew.
 ‘ The Tartary Oat was much lodged, which may account
 ‘ for the great quantity of light corn. The Angus Oats
 ‘ were threshed, and measured the 10th November ; the
 ‘ other oats between December 20 and 26.

‘ WILLIAM TAYLOR,’ } *Visitors.*
 ‘ LUKE SEYMOUR,’ }

When the weight per bushel of oatmeal is taken from the weight per bushel of oats before being kiln dried, the weight of the husks and moisture is about 16 lbs. ; and after being kiln dried the weight of the husks is about 12 lbs. ; therefore where the bushel of light corn does not weigh more than 16 lbs. it may be concluded that it contains little or no meal.

Experiment 5th, by Sir H. V. Tempest, Bart.

Kind of Oats.	Bushels sown per acre	Wt. do. per Bushel.	when sown.	when reaped	Markable Corn		Light Corn.		Total.		Wt. per Bush.
					Bushels.	Weight.	Bushels.	Wt.	Bushels.	Wt.	
Angus	4		April 20	September 3		61		2½		63½	40½
Potatoe	3½		20	3		51		2		53	43½
Friesland	4½		20	3		45		3		48	42

‘ The land upon which these were grown, was pared and burnt, and two crops of turnips taken before the oat crop.

‘ WILLIAM TAYLOR,’ }
 ‘ ROBERT WAUGH,’ } *Visitors.*

1804. Experiment 6th, by Mr Robert White, of Kelso.

Kind of Oats.	Bushs. sown p. acre.	Weight per Bushel.	sown April	when reaped, Sept.	Marktable Oats.		Light Corn.		Total Bushs.	Total Weight, lbs.	Wt. per Bush.
					Bushs.	Weight, lbs.	Bushs.	Wt. lbs.			
Frieze-land	4½	40 8-10	18	3	60	2430	4	128	6½	2558	40
Potatoe	9½	42½	18	8	54	2295	2	87½	56½	2382½	42½
Angus	4	37½	18	15	66	2376	5½	162	71½	2538	36

1806. Experiment 7th, by Mr Mason, of Cbilton.

Kind of Oats.	Bushels sown per acre.	Weight per Bushel.	When sown, or when reaped.	Market ble Corn		Light Corn.		Total Bush.
				Bush.	Wt. p. B.	Bush.	Wt.	
Potatoe	4	lbs. 40	April. 4	68	lbs. 40	3	lbs. 71	71
Angus	4	40	Sept. 11	67	38	3	65	70
Friezland	4	42	Aug. 28	57	41	3½	69½	60½
Tartary	4	37	Sept. 15	82	35	9½	65	90½

‘ These crops were after the second year’s clover; depastured the second year, and mown for hay the first. The crops preceding were wheat, drilled turnips (highly manured), oats, after being ploughed out from grass 20 years old. The soil a deep loam, under stratum limestone.’

The above experiments have been conducted with great accuracy and attention, and contain a considerable fund of information; but experiment 4th, by Mr Geo. Taylor, is by far the most valuable, as it ascertains the quantity of meal afforded by a bushel of each kind of oats—the true touchstone by which their several merits must be tried, as the number of bushels per acre is extremely fallacious as to the value of the crop. The quantity of oatmeal per acre is the only criterion by which the value of a crop of oats can be truly appreciated; and upon this principle the merits of the different varieties of oats in the fore-going experiments may be examined and fairly estimated. For this purpose I shall take some of the principal experiments, and calculate the oatmeal per acre of the different kinds of oats, from the data there given.

Kinds of Oats.	Mr Gen. Taylor's, No. 4.			Mr Mason's, No. 7.			Mr Nathan's, No. 2.			Mr White, No. 6.		
	Bushels per acre.	Oatmeal per Bushel.	Oatmeal per acre.	Bushels per acre.	Oatmeal per acre.	lbs.	Bushels per acre.	Oatmeal per acre.	lbs.	Bushels per acre.	Oatmeal per acre.	lbs.
Tartary	60	17	4	1035	82	1414½	88	1518				
Angus	68	20	7	1390	67	1369½	69	1410		66		1349
Potatoe	59	24	15	1471½	68	1695½	62	1546		54		1346½
Friezland	41	21	5	873½	57	1214½				60		1278½
Red	45	21	15	987								

From the above experiments it appears, that the Tartarian Oats produced the greatest number of bushels per acre; and the Potatoe Oats the greatest weight of meal, though the number of bushels per acre was considerably less.

The harvesting of oats is much the same as for barley, being cut both by the sickle and the scythe, and bound and set up in the same way : the straw is used for fodder for horses and cattle ; the grain is principally consumed by horses ; a portion is made into oat-meal, for hasty-pudding and crowdy, which are used for breakfast by the labouring people in some parts of the county, especially in winter, when milk is scarce. There is little or no oat-bread used.

SECT. VIII.—PEASE.

PEASE are principally sown upon old arable lands, that are improper for oats. The land is ploughed before winter, and the late kinds sown or drilled without any more ploughing in February, if the season suits. The early sorts are put in, even so late as the beginning of April. The kinds most commonly cultivated are of the late kinds.

The quantity of seed is from 2 to 3 bushels : the produce upon those old worn out lands from 10 to 15 bushels : upon better soils the produce sometimes reaches as high as 30.

Mr Mason has for some years sown white pease adjoining the common field pea, but never found them so productive.

The harvesting of pease is performed by cutting or tearing them up with sickles or pea hooks, and laying them in small heaps, which are turned over at proper inter-

vals, and when sufficiently dry, are bound up and carried. Pease are a very precarious crop to harvest in wet weather; and in such seasons great losses are sustained, which has caused their cultivation considerably to decline.

The straw is given to horses, and the grain is applied to feeding pigs, and given to horses amongst their oats. They are never used for bread here.

SECT. IX.—BEANS.

UPON strong deep soiled lands, in the south-east part of the county, beans have been long cultivated: before the introduction of clover, they were sown broad-cast after wheat, upon one ploughing. They are now sown broad-cast, after clover, upon clay soils; and where drilled, are taken as a fallow crop after oats, and as a preparation for wheat. The ploughing, &c. for drilled beans, is the same as described in the Northumberland Report, to which I beg leave to refer.

Mr Bamblet, of Haverton Hill, drills at 18 inches intervals, $3\frac{1}{2}$ bushels per acre: produce, 30 to 40.

Messrs Colling, Mason, Seymour, &c. drill at 30 inches intervals, 3 bushels per acre: produce from 25 to 35.

Mr Buston, of Long Newton, drills at 30 inches intervals: produce, 20 bushels. Broad-cast beans on the same lands only 15 bushels.

The time of sowing is the first favourable weather in February or March.

The sorts most commonly sown, are the large horse beans.

The quantity of seed, 4 bushels for broad-cast; and 3 to 3½ when drilled, and deposited at about 3 inches deep.

They are both horse-hoed and hand-hoed. Beans are not "cut very green" in this district. They may be cut as soon as the grains are black-eyed, but are much better perfected when they are suffered to stand until the lowest pods begin to turn black.

They are harvested by sickles and mowing, and after lying a few days to wither, are tied up in sheaves, and set up in stooks until dry enough for stacking.

The straw is given to horses and cattle, and the application of the grain is principally to horses and swine: sometimes bean meal is given to fat cattle.

SECT. X.—TARES.

TARES are mostly sown in this district for soiling horses. They are sown in March, with about 2 bushels of seed per acre, and are cut in July or August. Mr Seymour informed me, that an acre kept four horses four weeks, which at four shillings per week each horse, makes the value three pounds four shillings per acre.

SECT. XI. AND XII.

LENTILS and buck wheat are not grown in this county.

SECT. XIII.—TURNIPS.

THE soil most proper for turnips is dry loam ; but the value of this plant is such, that those who are not blessed with this description of soil, sow it upon moist loam and peaty soils, where tolerable crops are obtained, but the great difficulty is getting them off the land in winter. Where old grass lands are pared and burnt, they are sown upon all descriptions of soil.

The land intended for turnips is ploughed before winter, and four or five times more in the spring and summer, previous to sowing : it is also repeatedly harrowed and rolled, in order to pulverize it, and to destroy the quickens or couch grass, which in wet summers it is necessary to gather by hand.

They were formerly sown broad-cast, but are now mostly, if not all, drilled at from 27 to 30 inches intervals, according to the mode described in the Northumberland Report.

The quantity of manure is from 15 to 20 cart loads per acre.

The time of sowing is from about the 1st June to the 1st July, but from the 10th to the 25th of June is reckoned the best season.

The sorts cultivated are, the white globe, the yellow bullock, and the red.

The fly occasions considerable losses every year, by destroying the plants in the seminal leaf. Plants that have come up with every sign of health, will disappear in a few days by the ravages of this destructive insect, for which no remedy or prevention has yet been discovered. Under such unfortunate circumstances the suffering cultivator has only to chuse, whether to sow the field over again with turnips, or plough it up for autumn wheat. Where turnips are sown broad-cast, they seldom succeed upon a second sowing ; but where they are drilled, they may be sown over again with success, and the operation performed in a little time. The mode I have practised with most success, is to horse-hoe the top of the one-bout ridges, where the plants have failed, then set them up again with a double mould board plough, and immediately sow the seed by the drill in the usual manner.

Turnips are now all hand-hoed : those in drills are set out at 8 or 9 inches distance, by women and children ; the expence 4s. per acre : after which they are horse-hoed or ploughed between ; then hand-hoed again ; after which a double mould board plough is passed through the intervals, and the earth thrown up on both sides to the turnip plants : but in doing this, care ought to be taken not to put the earth so high as to bury the plants.

The consumption is by cattle and sheep. For the former they are drawn, and given to fat cattle in some adjoining field, or more generally in feeding stalls or

sheds, and to those wintering upon straw, they are given to them sometimes in the field, but ought always to be in the fold yard, which would save a great deal of manure, and prevent the land on which they are given to the cattle, from being poached and injured by their treading, besides the winter eatage of the field being lost to the sheep flock.

For sheep they are mostly drawn into another field, except upon very dry sandy soils, or weak loams: on such they are eaten upon the land; and on some medium poor soils, every four drills are drawn, and four left to be eaten where they grow. In those cases they are hurdled off in portions according to the number of the flock. Upon soils of this description, eating the turnips where they grow is beneficial, both by manuring the land, and giving it a greater consistence by treading. Hurdles for this purpose made in the county, cost about 1s. 9d. per yard; but Mr Nesham and Mr Mason have gotten some hurdles from Hampshire, made of oak, split very thin, the bars being 4 inches broad, and 3-16ths thick; they have 4 bars, are 40 inches high, and 7 feet long, and are so light, that a shepherd can carry eight or ten of them. The price is 1s. 9d. per yard; but being made of oak, they will last much longer than those made of ash, now used in the county.

The value of turnips of late years has been from 7l. to 10l. an acre, for the best crops; and if let by the week, from 6d. to 8d. per week, for sheep of 20 lbs per quarter.

SECT. XIV.—RAPE OR COLE SEED.

THIS plant was formerly cultivated for seed only: it is not much more than sixty years since it began to be employed for sheep feed. When intended for this purpose it is grown upon all sorts of soils, but generally upon lands thought too moist for turnips. The ploughings, manuring, &c. are much the same as for turnips, the great object being to get the land cleared of quickens against the time of sowing, which is (or ought to be), the beginning of June; the quantity of seed sown about 4 lbs. per acre: when sown broad-cast, it is hand-hoed; when drilled, both horse and hand hoed.

Mr Seymour estimates the value of his crops eaten with sheep, at from 2*l.* to 3*l.* per acre; and says, that the wheat crops after it are very superior to those upon naked fallows on the same soil, and with the same quantity of dung.

For seed it is now seldom grown on lands in rotation; but upon heathy moory soils, after paring and burning, as the first crop; for this purpose the land is ploughed once or twice, and the seed sown from the 12th to the 20th August, at the rate of about half a peck an acre. It is generally ripe in the latter end of July or beginning of August. The produce from 20 to 40 bushels per acre, and the price from 20*l.* to 50*l.* per last.

It is reaped with sickles, then tied up in sheaves, and set up in stooks, and when dry, led to a convenient part of the field, where it is threshed generally in one day. It

being an old established custom, to raise for this purpose a whole country side of men, women, and children, to what is called the *rape cloth*. Every one is appointed to his station—some to thresh, some bring and place the sheaves, others take away the straw, winnow the grain, &c. &c. It is a day of hard labour and merriment, attended with abundance of good cheer, and plentiful libations of ale, and the evening concludes with dancing and social festivity, &c. &c.

Mustard.

This plant was formerly much grown in this county, and *Durham Mustard* was proverbial for its excellence. At present a crop of mustard is rarely met with. It is generally sown upon pared and burnt land in April, one pound per acre. The produce about 20 bushels per acre, and price from eight to sixteen shillings per bushel.

SECT. XV.—CABBAGES.

THE first cabbages I recollect to have seen in the county of Durham, as a *field crop*, was about 35 years since, at Raby, belonging to the late Earl of Darlington. This first essay was an excellent crop, and probably few better have been since grown in the county.

I resided for some years afterwards in the neighbour-

hood, and did not see any of his Lordship's tenants make a similar experiment, or follow the example his Lordship had set them; and it seems that this plant since that time has made little progress, as at present their cultivation is confined to a few of the principal farmers—as Messrs Collings, Mason, Taylors, Nesham, &c.

The best soil for cabbages is admitted to be a deep mellow loam, but when properly cultivated they succeed very well on strong loams, and as there are many farms of this description without any turnip soil, the cultivation of cabbages on such situations is peculiarly valuable.

The best time for sowing the seed in the nursery, in this climate, is about the 10th or 12th of August, where they remain until they are wanted for planting next spring.

The land where they are intended to be planted is ploughed before christmas, with a deep furrow, and in the ensuing spring, whenever the land is sufficiently dry, ploughed two or three times more; it is then put into ridges of three feet breadth, the manure put into the hollow intervals, and covered up by splitting the three feet ridges upon it: upon these new made three feet ridges the cabbage plants are put in, at three feet distance from each other. This finishes the planting operation. The best time for planting in this climate is the latter end of April.

After the plants have taken root, and the deficiencies of those that failed been supplied, the first opportunity should be taken when the land is in a proper state between wet and dry, to horse-hoc, or rather *plough the intervals with a deep furrow*, which gives a command of performing every operation during the summer, however dry the season may be, and may be either horse-

hoed or ploughed, whenever necessary, so long as the leaves will admit : at this period the earth in the hollow intervals is ploughed up to the plants on each side by a double mould board plough.

In planting cabbages, it has been usual to set them promiscuously, at three feet distance, on the tops of the drills, so as to form a right line only one way, as in fig. 1, plate V.

But I have found it much better to plant them in lines not only length-ways of the drills, but also across, as in fig. 2, plate V, which gives an opportunity of horse-hoeing or ploughing *across the drills*, as well as *between them*. This horse-hoeing across is much better and cheaper than hand-hoeing, and makes a much more complete fallow.

To plant them in this manner may be easily done as follows :—Set up a pole on each of the outside rows, at the proper distance intended for the plants, and place another near the middle, in a right line with the other two. These three poles will be an unerring guide for the planters to place their line by.

The consumption is chiefly by cattle, and principally milk cows, as they do not make the milk taste so much as turnips, if care be taken to pull the decayed leaves off them.

They are also given to sheep in the autumn and in the early part of winter ; but in spring they do not eat them so well as turnips.

They are always carted off: to eat them on the land would be a most wasteful and slovenly practice.

SECT. XVI.--RUTA BAGA.

THE soil, tillage, manuring, and the quantity of seed sown, and hand-hoeing, are the same for ruta бага as for turnips. The yellow kind is mostly cultivated, being thought preferable to the white. The time of sowing from the middle of May to the middle of June. I believe the earliest season is the best, as those that I have sown about the 20th May got to a greater size than what were sown a fortnight or three weeks later. George Baker, Esq. of Eleinore, and from his example Mr Ashworth, of Hutton Henry, sowed ruta бага in the beginning of May, and both had the best crops then in the county.

Their application is to feeding sheep and cattle, but chiefly the former, as they are thought to fatten much quicker upon this plant than upon turnips: for this purpose, from their being so much harder than turnips, it has been found beneficial to have them cut into oblong pieces, that animals may eat them with more ease; but their chief value is in their being good solid food (not spongy) very late in the spring, and much more nutritive than common turnips.

They are also given to horses, at the rate of about four stones per day, which, with straw, will keep them in good condition.

Their value has not yet been ascertained, by being grown for sale as turnips are, but it seems to be a pre-

vailing opinion that an acre of good ruta бага is of more value than an acre of turnips.*

SECT. XVII.—TURNIP CABBAGE.

SECT. XVIII.—KHOL RABIE.

I found very few farmers that knew or even had heard of this plant. Messrs Taylor, of St Helen Auckland, had a few in the garden by way of experiment.

I have grown this plant for two years: the few observations I have made, and experiments I have tried, may probably be of use in making an estimate of its value, compared with others of the same genus.

On the 21st December, 1807, I put 21 tup hogs to ruta бага, khol rabie, and common turnips: they were

* By some experiments I made and recorded in the Northumberland Report, tups of 12 st. 11 lbs. weight, eat per day of common turnips, 31 1-3d lbs.; of ruta бага, 17½ lbs. And ewes of 9 stones weight eat per day, of common turnips, 15½ lbs.: of ruta бага 8½ lbs. Hence it may be inferred that a crop of ruta бага 17 tons weight, is equally valuable as a crop of common turnips of 31 tons.

divided into three parcels of seven each, and then weighed as follows:—

	<i>sts.</i>	<i>lbs.</i>	
Lot 1.	50	10	put to ruta бага,
2.	48	13	to khol rabie.
3.	48	2	to common turnips.

On the 4th March the khol rabie being all eaten, the result was, that they had eaten on an average of 73 days,

	<i>lbs.</i>	
Lot 1.	19	per day each sheep of ruta бага.
Lot 2.	17½	ditto ditto of khol rabie.
Lot 3.	30	ditto ditto of common turnips.

The weight gained by lots 1 and 2 in 73 days, was nearly equal, viz:—about 20 lbs each sheep; and lot 3 gained about 16 lbs. each sheep.

Between the 4th March to the 18th April, one of the 1st lot died, and the experiment was continued with lot 2nd at ruta бага, and lot 3rd at turnips. The former ate 20 lbs. per day, and gained 8 lbs each sheep, in 28 days; and the latter 33½ lbs. per day, and gained 6 lbs. each sheep.

From the above it appears that ruta бага and khol rabie are nearly upon a par in respect to the weight eaten of each, and also to their feeding quality. The ruta бага appeared to have the greater weight per acre, but I was prevented from ascertaining this by the hares beginning to eat the khol rabie early in November, and before christmas they had scarcely left a whole plant.

Their partiality for them is such, that though there was ruta бага and common turnips in the same field, yet they left these unbroken, and singled out the khol rabie, where ever it had been transplanted amongst the others. The year following, in a field of five acres of ruta бага, I had half an acre of khol rabie, of which they did not leave a whole plant before January, and scarcely touched the ruta бага. Being so situated with respect to hares, I am obliged to abandon the culture of khol rabie ;—as they transplant with the same certainty of growing as common cabbages, they may be of use to fill up vacancies where the common turnip or ruta бага have failed, even should they be found upon further trial not to be so valuable as either of the above plants.

As it is of great importance to know which kind of turnips produce the greatest crops, and also the best modes of cultivating them, the Rusheyford Society directed a number of experiments to be made, in order to ascertain those points, which they have with great liberality enabled me to lay before the public.

‘ This experiment was made on the farm of Mr Seymour, of Woodhouse Close, on a scale of half an acre for each of the six divisions here specified. The land was not real turnip soil, but well worked and cleaned from water grass, &c. which the nature of the soil had made prevalent. The land may be valued at 28s. per acre, and had 20 fothers of rotted manure applied to each acre. During the growth of the turnips the land had been kept perfectly clean, and was so in Dec. 1st, when the trials were made. The quantity of Swedish turnips is here very deficient, as in Nos. 2 and 3, perhaps the quantity of manure allowed is too small for this species, which is generally indulged more in that respect than the English; but if such indulgence be necessary, it is a material objection. The specific gravities were intended to have been tried, but as they had been so in experiments No. 2, and not found so materially differing as was expected, it was thought unnecessary. But it is recommended to make the comparison with regard to the specific gravities in the latter end of March, then the difference will probably be more apparent, and the inferiority imputed to the Swedish and Yellow Bullock kinds is thought to be most conspicuous.

‘ ROBERT PAGE,
‘ GEORGE TAYLOR, } *Visitors.*

Experiment 2nd on Turnips, by Mr William Taylor, at Bishop Middleham, 1803.

Kinds of Turnips, and mode of culture.	Weights per acre, computed from the actual weights of 20 square yards.						Proportion of bulb to the whole plant.	Reduced proportion of the whole plant.	Dn. of bulbs.	Sp. gravity of bulbs on an average, Nov. 30	Ditto, March 28, 1804.
	Of bulbs.	Of tops and tails.	Of tops.	Of tails.	Of whole plants.						
<i>Yellow Bullock.</i>	tot. cwt. st. lb.	tot. cwt. st. lb.	tot. cwt. st. lb.	tot. cwt. st. lb.	tot. cwt. st. lb.						
Broad-cast	27 3 3 5 4	16 4 6 4	7 7 40	8 5 231	19 7 11	.849	1.891	2.202	.907		
Drilled at 30 inches	18 1 2 0 2	17 4 3 2	14 3 50	3 0 1230	18 6 3	.862	1.237	1.464	.907		.790
<i>Reda Baga.</i>											
Drilled at 30 inches	12 6 0 6 4	12 1 12 4	3 4 100	8 5 216	18 2 4	.785	1.000	1.000	1.019		.966
<i>White Globe.</i>											
Drilled at 30 inches	23 5 2 13 6	6 6 6 5	19 6 40	7 0 229	12 1 5	.727	1.735	1.885	.922		.770

' The turnips were all sown the 17th June ; * the land
 ' clean, and in good tilth, manured with 17 fother of
 ' well rotted fold-yard manure per acre ; all twice hand-
 ' hoed, and the drilled were furrowed up : all suffered by
 ' drought. The land is worth about 35s. per acre. Its
 ' previous management had been for 20 or 30 years prior
 ' to 1797, by a rotation of barley, oats, fallow. In 1797,
 ' it was barley ; 1798, turnips ; 1799, barley ; 1800, clover
 ' hay ; 1801, ditto ; 1802, wheat. With regard to the
 ' inferiority of the Swedish turnip, and ascertainment of
 ' the specific gravities, see the observations in No. 1.
 ' In calculating the reduced proportions, the reduction
 ' of the quantities was proceeded in no further than to
 ' stones, the pounds being neglected as too trivial. So
 ' also in No. 1. This experiment is little more than a
 ' comparison of the kinds of turnips, for two of those
 ' kinds afford no comparison of the drill and broad-cast
 ' culture, from Mr Taylor having mistaken the directions
 ' of the committee. In two instances out of three, (viz :
 ' in Nos. 2, and 3), the broad-cast yellow bullocks are
 ' superior to the drilled, which Mr Mason observes,
 ' may be partly owing to the small proportion of tops
 ' in this species, allowing them to be left nearer in the
 ' hoeing, which could not be so much taken advantage
 ' of in drills already set out at the usual distance, from
 ' the cultivator not being aware of the difference.

' LUKE SEYMOUR, }
 ' GEORGE TAYLOR, } *Visitors.*

* Was not this too late for ruta bega ?

Experiment 3rd on Turnips, in 1803, by Mr Masen, at Pagebank.

Kinds of Turnips, and mode of culture.	Weight per acre, computed from the actual weight of 8 square yards of broad-cast, and 40 of drilled.				Proportion of prop- tion of prop- bulb to tion of the whole plant.	Do. of bulbs.
	Of bulb.	Of tops.	Of both.			
	tns. cwt. st. lb.	tns. cwt. st. lb.	tns. cwt. st. lb.	tns. cwt. st. lb.		
<i>Yellow Ballist.</i>						
Broad-cast	34 16 6 8	6 9 5	1 41 6 3	9	.843	2.149
Drilled at 90½ inches	29 18 0 0	4 5 3	5 34 3 3	5	.875	1.777
<i>Swedish.</i>						
Broad-cast	16 14 7 3	3 15 4	13 20 10 4	2	.815	1.067
Drilled at 90½ inches	16 10 4 6	2 13 6	11 19 4 3	3	.859	1.000
<i>White Globe.</i>						
Broad-cast	23 17 7 12	1 7 5	40 19 7 3		.704	2.133
Drilled at 90½ inches	23 10 0 0	8 5 2	34 15 2 3		.797	2.120

'Grown on a dry deep mellow loam. The ruta бага were in-
'jured by a number of cattle getting amongst them.'

Experiment 4th on Turnips, by Mr Wm Taylor, at Bishop-Middleham, 1804.

Kinds of Turnips, and mode of culture.	Weight on 16 square yards.		Weight of bulks per acre.	
	Top.	Tails.	Bulbs.	
	lbs.	lbs.	sts. lbs.	tot. cwt. st. lbs.
<i>White Glask.</i>				
1 Drilled at 29 inches	5½	3	10 10	20 5 1 1
2 Broad-cast	6½	2½	8 2	15 7 7 3
<i>Tilney Bullock.</i>				
3 Drilled at 29 inches	2½	1½	6 8	12 9 6 9½
4 Broad-cast	1½	0½	3 4	6 4 1 13
<i>Rota Baga.</i>				
5 Drilled at 29 inches	7½	5½	5 8½	10 12 0 2½
6 Broad-cast	3½	2½	2 5½	4 10 3 11½
7 Transplanted	4½	2½	5 2½	9 15 6 7½

Weighed the 28th February, 1805: tops much injured. Some of Nos. 1, 2, 3, 4, and 7, were decayed: 5 and 6 all sound; though these and No. 7, were much broken by the hares.

‘ The experiments were made on seven patches of ground, adjoining each other (each patch 4 yards broad, and 180 yards long,) the soil a light loam, approaching to a sandy gravel; sub-soil, a limestone rubble: the field flat, but dry. Crop in 1803, drilled barley. The ground was manured with 23 double horse cart-loads of fold-yard dung, and the seed sown the 22d June, 1804. The transplanted ones not put in until the rain came, but the ground prepared for them with the rest. The season was exceedingly dry for some time before and after the sowing. The drilled were twice hoed, and then furrowed up. The broad-cast thrice hoed; but the drilled are much cleaner. The prevailing weed is chick weed.

‘ WILLIAM TAYLOR.’

Mr Watson, of Middleton, near Wooler, having made experiments to ascertain the comparative merits between the drill and broad-cast culture of turnips, has been so good as to favour me with the following accurate account of them :—

“ A few years since, when I had several opportunities of obtaining the sentiments of practical farmers upon this subject, the prevailing opinion appeared to be, that under our northern mode of cultivating turnips in rows upon one-bout ridges, at intervals of 27 inches, the weight of the crop was inferior to that under the broad-cast husbandry; and the reason why the drill culture was almost universally pursued, was stated to be the dunging of an increased quantity of land, and the facility of

hoeing in that mode, I was, however, of a different opinion, and this was founded upon pretty accurate observations for many years, and has been fully confirmed by the results of two comparative experiments, I made upon adjoining ridges, where the soil was equal in quality, and where the management had been similar for many years, the quantity of dung applied in each mode was not only equal, but the quality also, for particular pains were taken to render the dunghill a homogeneous mass. The results in each year were nearly alike; in both years the weights of the *drilled turnips* were to those of the broad-cast husbandry, in the ratio of *four to three*.

“These seem very strong proofs of the superiority of our Northumbrian mode of cultivation; but the benefits do no rest altogether with the turnip crop, as appeared by the succeeding crop of wheat.” *

This experiment of Mr Watson's was made with the white globe turnip, and the result is nearly the same with those of Mr William Taylor, where the proportion of bulbs was as 20 to 15 nearly, and of Mr Seymour, where the proportion was as 20½ to 14½ nearly.

In the fore-going experiments the *ruta бага* has been drilled at the same width of intervals as the others: but as the bulbs and tops are so much less than the common turnip, it is to be lamented that some experiments were not made with this plant at narrower intervals; in Mr

* See this under the article wheat. p. 110.

Mason's experiment, where they were grown at intervals of 30½ inches, had they been at intervals of 20 or 21, it is probable that the crop would have been increased in the ratio of 2 to 3. Or where the intervals of common turnips were 28 inches, and the ruta бага had been at 21, the increased crop would probably have been in the ratio of 3 to 4, and the result of Mr Mason's crop would have been according to the first ratio, 24 tons; and according to the latter, 21 tons; and Mr Taylor's, 13 tons per acre.

It also appears that this plant was sown on the same day with the common turnip, viz: on the 22nd of June. This season has been found, (from long experience), to be the best in this climate for sowing *common turnips*; but I am inclined to think it is too late for ruta бага, as they grow much slower after coming up than other turnips. In Northumberland they are generally sown the latter end of May and beginning of June, and I have for the two last years sown some on the 20th May, and in the same field, some a week, and some a fortnight later; in both years the earliest had the largest bulbs; and by Mr Baker's experiment it appeared that those he sowed the beginning of May, were the best of that year: it is therefore to be presumed that the great width of intervals, and the too late sowing, may have both operated against the weight of produce of the ruta бага.

But the value of these esculent roots does not depend altogether upon their weight: it is the quantity of nutriment, or pounds of beef or mutton, to be obtained from a given weight, that is the true criterion by which the value must be ascertained.

By some experiments I made, and recorded in the Northumberland Report, it was found that some tups of nearly 13 stones live weight, eat per day—

				<i>lbs.</i>
Of ruta бага	-	-	-	17 $\frac{1}{4}$
Of common turnip	-	-	-	31 $\frac{1}{2}$

Which is in the ratio of 1 to 1.8164.

And ewes of 9 stones live weight eat

Of ruta бага	-	-	-	8 $\frac{1}{2}$
Of common turnip	-	-	-	15 $\frac{1}{2}$

Which is in the ratio of 1 to 1.8235.

And under the article ruta бага, it will be found that some tup hogs of 9 stones live weight eat—

Of ruta бага	-	-	-	20 $\frac{1}{4}$
And of common turnip	-	-	-	33 $\frac{1}{4}$

Which is in the ratio of 1 to 1.6024.

The average of these ratios is as 1 to 1.747

And may be taken as 1 to 1.75.

Hence if the weight of an acre of ruta бага be known, the weight of an acre of common turnips of equal value may be calculated. For instance, in Mr Mason's experiment—

$$\begin{array}{l} \text{As } 1 : 1.75 :: 16\frac{1}{2} : 28 \text{ } 11\frac{1}{2} \end{array} \left. \vphantom{\begin{array}{l} \text{As } 1 : 1.75 :: 16\frac{1}{2} : 28 \text{ } 11\frac{1}{2} \end{array}} \right\} \begin{array}{l} \text{which is 4 tons less than the} \\ \text{crop of common turnips.} \end{array}$$

But if it had been 21 tons, then—

As 1 : 1.75 :: 21 : 36 15, or 4 $\frac{1}{2}$ tons more than ditto.

In like manner was calculated the following table, shewing what number of tons of ruta бага and common turnip are equal in value :—

<i>Tons.</i>		<i>Tons.</i>	
10	of ruta бага are equal to	17.50	of common turnip.
11	ditto	19.25	ditto
12	ditto	21.00	ditto
13	ditto	22.75	ditto
14	ditto	24.50	ditto
15	ditto	26.50	ditto
16	ditto	28.00	ditto
17	ditto	29.75	ditto
18	ditto	31.50	ditto
19	ditto	33.25	ditto
20	ditto	35.50	ditto
21	ditto	36.15	ditto

SECT. XX.—CARROTS.

CARROTS have been grown at different periods, by various individuals, but have been always given up again. The late Ralph Ord, Esq. of Sands, near Sedgefield, about thirty years since, grew them with success: his soil was peculiarly favourable for their production, yet their cultivation at that place has long been discontinued. Mr Colling, Mr Mason, and most of the breeders of rams, have grown them for the purpose of giving to their sheep in the spring months; but as they think that

ruta бага answers the same purpose, and carrots being attended with so much trouble, they have discontinued their cultivation.

The best crop of carrots I ever saw, was grown about three years since, by Sir Thomas Liddell, at Bradley, on a piece of sandy loam adjoining Bradley Burn. When I viewed them, he had sold four tons to Newcastle, at 4*l.* per ton; and from the length of time he had kept a number of horses and pigs with them, I estimated from the quantity of ground then cleared, that they would make 50*l.* per acre.

SECTS. XXI AND XXII.—PARSNIPS AND BEETS.

I do not find that these roots have ever been cultivated in this county as agricultural crops.

SECT. XXIII.—POTATOES.

I have not been able to ascertain when this valuable root was first introduced into this county; but the place which has been longest known, and most eminent for its cultivation, is the village of Hamsterly, in the parish of Witton-le-Wear, where it has been grown as

an article of trade, and been the principal employment of several families for upwards of eighty years.

The soil most proper for potatoes, is a dry hazel loam, and the greatest crops are obtained from lands that have lain long in grass, the second year after they are ploughed out; but potatoes are grown upon every description of soil.

Land intended for potatoes is ploughed in the autumn, and two or three times more in the spring, with sufficient harrowing, to get it into a fine state: it is then set up into one bout ridges of $2\frac{1}{2}$ or 3 feet wide: the manure is then carted upon it, and laid in small heaps in every fifth drill, and from thence spread evenly by women and children with forks into the bottom of the two hollow intervals, on each side, as well as in that in which it was laid.

The manure accounted best for potatoes, is from a rough horse dung-hill, in a fermenting state: from 15 to 20 cart loads per acre is sufficient: too much dung is inimical to their mealiness, and in danger of making them waxy and watery.

The Hamsterly people are very particular in having their sets as perfect as possible; and in cutting them, throw aside all deformed potatoes, and all such as they suspect have a tendency to run wild, which from long practice they know with great precision: they cut each potatoe first into two parts, *lengthways*, and afterwards into more parts, *lengthways*, so that each part has not less than two eyes, or sprouts; after being thus cut, they let them remain ten or twelve days before they plant them, thinking they grow or come up sooner for it; as sets cut and planted the same day, did not come up so

soon as those that had been cut some days before : the sets are planted about a foot distance from each other in the drills.

The most favourite kinds at present with the Hamsterly people, are the red nebs, and the red streak, or pink eyes. The first is a long potatoe, with a red end ; the latter round, and beautifully streaked with red and white, and red eyes or sprouts : this is a valuable potatoe, being very prolific, and keeps later in the spring than any other potatoe I know ; we frequently have them good until the early kinds are ready for the table. There are many other varieties grown in the county, which it would be tedious, and of little use to enumerate.

The Hamsterly men plant them in March and April ; as they say the sooner they are planted, the better chance they have of getting *perfectly ripe* and *mealy* : but there is some danger from frost, when planted in March.

They are both horse and hand-hoed, and kept perfectly clear of weeds through the summer, and earthed up as the stems advance in height, by a single or double mould board plough ; and lastly, the earth is drawn up to the stems by the hand hoe.

They are generally taken up by a three-pronged dung fork (provincially a grape) ; and very often amongst farmers they are ploughed up.

The mode of storing them formerly, was in houses, and surrounded on all sides with straw ; but they were frequently frosted in this way : and that of keeping them in conical heaps at the door, covered with straw, and over the straw eight or nine inches of earth, was resorted to : if well done up in this way, they are seldom or never injured.

The produce of an average crop is about 200 bushels per acre. The price varies from two to three shillings per bushel.

The application is principally for human food. The small potatoes are given to swine, and small portions are given to horses and cows, especially in years of abundant crops, and when prices are low.

About thirty years since many private families made all the starch they used, from potatoes; and probably the practice may yet be continued: but so far as I have been able to obtain information, there never was any public manufacture of starch in this county.

I have seen very good bread made in this county of half potatoes and half wheat flour; but I think the best mode of applying potatoes as an article of human food, is without any admixture.

Diseases.

Potatoes are liable to run wild, a property which I believe few people are acquainted with; those that have run wild, or are tending to that state, produce more flowers than the rest, and continue flowering much later, sometimes till Michaelmas, and do not apple so abundantly as the other potatoes; the stem at the top is more slender, and rises higher than the rest, sometimes 12 or 15 inches; they are very unproductive, seldom having more bulbs than one or two at a root, and these have deeper eyes, or some other deformity, by which the Hamsterly traders readily know them. In the long kind of potatoes, the wild ones are much

smaller at one end than the other ; a perfect healthy potatoe should be equally broad at both ends.

It is nearly thirty years since I first became acquainted with the nature of wild potatoes, from the information of the Hamsterly people, and it is probable they had been acquainted with the circumstance many years before, yet it is somewhat singular, that this discovery should not have been more generally known in the county, and that it should not have travelled beyond the verge of this hamlet, but confined itself to its humble and industrious inhabitants, who have for many years deservedly reaped the due rewards of their attention and ingenuity.

I have been conversant with growing potatoes for upwards of fifty years ; in the early part of that period the kidney potatoe was most deservedly an universal favourite, being mealy, well tasted, and productive : by degrees it became less and less productive, and from this circumstance gave way to other new and more profitable varieties, and this once favourite variety is now totally lost, as well as the rough white, which at that period was another excellent potatoe, (though not so generally known as the kidney), cultivated by a relation of mine for many years, until they did not produce more than two or three at a root, most probably owing to their having, as well as the kidney, degenerated into a wild state, a property which at that period was not known.

The disease of the curl was first observed in this district about thirty years since : before that time it was not known, and probably it is peculiar to some varieties of potatoes, as there are others that seem to be particularly ex-

empt from it. I have cultivated the red-streak or pink-eye upwards of twenty years from the same original stock, and never observed a single curl amongst them; and upon my remarking this to the Hamsterly people, they said it was the same with them.

Mr Culley also informs me that he has grown the black potatoe for his horses for upwards of thirty years, without ever seeing a curl amongst them; and these were from an original stock of two potatoes, he brought out of Ireland.

SECT. XXIV.—CLOVER.

THE introduction of clover into any district forms a new era in its agriculture. From the best information I have been able to obtain, I have reason to think that clover was first sown near Herrington, by a Mr Easterby, and that he grew it several years before any of his neighbours had the hardihood to break through their old established custom, or divest themselves of inveterate prejudice.

Clover is most generally sown with wheat or barley, and sometimes with oats, especially upon thin moory soils.

The quantity of seed is from 7 lbs. to 14 lbs. per acre.

The time of sowing, April and May; but the greatest

quantity is sown from the middle of April to the middle of May.

The uses to which clover are applied are for hay, pasture, and soiling : the last is an application of late years, and in 1796, Mr Robert Colling informed me, that it was then only practised by himself and a few other farmers ; but it is now become more general to keep draught horses on clover through a great part of the summer.

Mr Bamlet kept ten horses from the beginning of June to October upon three acres of clover ; the exact dates were not given, but supposing the time sixteen weeks, and that the keep of a horse is worth 4*s.* per week, or 3*l.* 4*s.* for sixteen weeks, of course the keep of ten horses would be worth 32*l.* which makes 10*l.* 18*s.* 4*d.* per acre for the clover. Something should be deducted for mowing, carting home, &c. ; but this will be more than balanced by the quantity of manure that would be acquired by this mode of consuming the crop.

To the enquiry, Is the land tired of clover ? I shall put down a few of the answers I received.

Messrs Robert and Charles Colling have found their crops declining for several years.

Mr Seymour finds his clover not so good as when he first began to grow it.

Mr Buston, of Long Newton, has sown clover upwards of thirty years : for some years back it has begun to fail in May, and goes off all through the summer.

The Board asks, "*Is the land tired of clover ; and in that case, what variation of course ?*" I do not find that any experiments have been made in the county to ascertain this point ; but in the neighbourhood of

Wooler, in Northumberland, some of the most intelligent farmers find, that a course of three years tillage and three years grass, is a much more profitable system than one year's clover, or any other system they have tried.

Mellilot: (Trifolium Officinale.)

The late Mr John Ovington, of Hart, informed me in 1796, that a piece of land which had missed clover, produced so much mellilot, that it was mown for hay, and given to cows. They were uncommonly fond of it, and throve much better with the mellilot hay, than on the best old land hay in the vicinity of Hart.

This county in many places is very subject to this plant, where it is considered as a noxious weed among corn, as it gives the bread a very disagreeable taste.

SECT. XXV.—RAY GRASS

Is sown upon every description of soil, and is a plant of such peculiar properties, that all kinds of soil seem to be adapted to its growth, as it flourishes on the driest and softest loams, on the strongest clays, and on spongy peat earths; it grows early in spring, and late in autumn, and even all through the winter, if the weather

be mild and fresh ; and taking it " all in all," is probably one of the most valuable perennial grasses we have, to sow in *small quantities*, along with clover and other grasses, as is the practice here ; it never being sown alone, except for seed.

The time of sowing is April and May, and the quantity, when sown with clover, from one to two pecks per acre. When sown alone for seed, about one bushel per acre.

As it is sown along with clover, its application is the same, viz : for hay, for pasturage, and for soiling. What is sown for seed is very trifling, few farmers sowing more than for their own use, and to prevent being imposed upon by an annual sort, which of late years has very frequently been imported from London.

As a preparation for corn crops, when suffered to stand for seed, it has much the same effect as all culmiferous plants have that are suffered to ripen, or the same as if the land had produced a crop of corn, as the following experiment will exemplify.

Mr Taylor, of St Helen's Auckland, sowed half an acre with ray grass, for seed ; the remainder of the field was sown with red clover, part for clover seed, and the remainder for soiling horses, which was mown for that purpose three times during the summer.

That which was intended for clover seed, was mown the first week in June, and suffered to rise again for seed ; the ray grass was mown when ripe, and the place where it grew continued a bare stubble during the autumn ; where the clover grew was very good sheep eating ; the whole was ploughed in October, and sown with wheat : on the portion where the ray grass grew,

the corn through the ensuing summer looked yellow and sickly; the rest of the field where the clover grew, was a dark green and healthy: the produce not accurately compared, but that upon the ray grass land was considered very inferior to the rest of the field.

CHAP. VIII.

GRASS LANDS.

SECT. I.—MEADOWS.

THE old meadow lands in this county may be all deemed *upland meadows*, there being few of any other description: the soil of those meadows is generally of the best quality the farm or district produces, and fields of this description, as well as the rich old grazing pastures, are carefully reserved from the plough, and many of them have most probably remained in this state for ages.

The produce of hay is from 1 to $1\frac{1}{2}$ tons per acre; on some rich soils 2 tons, and value of the fog or aftermath from 20 to 30 shillings.

The expence of mowing on an average is 4s. per acre; that of making hay is uncertain, as much depends upon the weather; but on an average of years, making and stacking may be taken at 7s. 6d. per acre.

Where lands are mown every year, they are manured once in three or four years, with about fifteen cart loads of dung per acre. They are sometimes mown one year, and depastured the next.

In the vale of Tees they have a singular and very an-

cient practice of stacking their hay in the middle of the field, and foddering the cattle through the winter all over the field: the cattle are not housed, and by drawing under the hedges for shelter, a great part of their dung is dropt there, which is carted to such parts of the field as are thought to be most in need of it. The scite of the hay stack is removed every year, so that in a few years a stack has stood in almost every part of the field. Towards the end of winter, a field in which the hay has been eaten in this manner, has every appearance of slovenliness and waste, not only of hay, but of manure; yet the practice is defended by some farmers, who assert that lands under this management continue to produce as good crops, as if the hay had been eaten in a fold yard, and the dung brought and laid regularly upon the field.

SECT. II.—PASTURES.

ON the best old grazing pastures the quantity of land necessary for a stint (or for feeding an ox or cow of 60 or 70 stones weight), is from $1\frac{1}{2}$ to 1 acre; but there are not many pastures of the latter description: they are found only in a few places, as on Skernside, Binchester, Stanhope, Billingham, Staindrop, Barnardcastle, and a few other places.

They are depastured with feeding stock from the beginning of May until the latter end of September or beginning of October, and from thence through the

winter. It is usual to put one per acre, or where circumstances are favourable, three sheep to two acres.

The *rent*, from forty to sixty shillings per acre.

"*The produce in meat per acre*" depends more on the nature of the animal, than on the quantity of food consumed; as some kinds of stock of a quick feeding breed, will produce double the weight of meat for the same quantity of food that will be done by one of a slow feeding tribe. It is generally reckoned that a two years old short horned ox, of the improved breed, will gain in twenty weeks, from May-day, 15 stones, or 10½ lbs. per week.

When I resided in the county of Durham, about thirty years since, I sometimes amused myself with taking an account of the different plants growing in old meadows, of different soils and situations; from these lists I find, that on dry loamy soils, the following plants were the most abundant:

<i>Dactylis glomerata</i>	- -	Rough Cocksfoot
<i>Lolium perenne</i>	- - -	Perennial Ray-grass
<i>Cynosurus cristatis</i>	- -	Crested Dog-tail
<i>Alopecurus pratensis</i>	- -	Meadow Fox-tail
<i>Festuca duriuscula</i>	- -	Hard Fescue
<i>Poa trivialis</i>	- - - -	Rough-stalked Poa
<i>Poa pratensis</i>	- - - -	Smooth-stalked Poa
<i>Avena flavescens</i>	- - -	Yellow Oat
<i>Bromus mollis</i>	- - -	Soft Brome
<i>Holcus lanatus</i>	- - -	Woolly Holcus
<i>Plantago lanceolata</i>	- -	Ribwort Plantain
<i>Trifolium pratense</i>	- -	Perennial Red Clover

DURHAM.]

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Trifolium repens - - - White Clover

Achillea millefolium - - Yarrow

Vicia sepium - - - - Bush Vetch

Poterium sanguisorba (Little Burnét) grows in great abundance upon the sandy loams adjoining the river Wear; and upon moist loams, *Festuca elatior*, *Phleum pratense*, and *Rhinanthus crista galli*, are very prevalent.

Of the above plants, the rough cocksfoot, ribwort plantain, bush vetch, yarrow, and red and white clover, grow the quickest and most vigourously, after being cut (and in the order they are named) and constitute the principal part of the rich and luxuriant fogs, which the best lands of this county are so remarkable for producing.

Dairy Grounds.

The products of these are either butter and cheese, or milk for sale.

Where the first is the chief object, I find that the average of different dairies is as follows.

Upon land of the first quality, where the principal object is new milk cheese, in a dairy of eight cows, on an average of three years,

The Produce was—

	£.	s.	d.
Cheese, 26 cwts. at 3 <i>l.</i> per cwt.	78	0	0
Whey butter - - -	7	0	0
Butter, from 20th Nov. to 12th May	21	0	0
Eight calves rearing - - -	27	0	0
Eight pigs - - -	12	0	0
Total produce	£145	0	0

Expences.

Dairy maid * - - -	8	8	0
Rennet - - - - -	1	4	0
Salt - - - - -	2	0	0
Annetto - - - - -	1	0	0
Each cow 2 bushels of bean meal, and 5 bushels of bran - - -	8	0	0
Total Expence	£20	12	0

Total produce - - -	145	0	0
Deduct expence - - -	20	12	0
Neat produce of eight cows	124	8	0
Or per cow - - - - -	15	11	0

* Nothing is charged for the board of the dairy maid; as her other work is thought equal to her board.

Upon other farms where butter was the chief object, the average produce of one cow is as follows :—

						£.	s.	d.
Butter, three firkins	-	-	-	-	-	9	10	0
Cheese, 2 cwts. at 25s.	-	-	-	-	-	2	10	0
Calf	-	-	-	-	-	3	0	0
Pigs	-	-	-	-	-	1	10	0
Total produce						£16.	10	0
Dairy maid, salt, &c. per cow						1	10	0
Neat produce per cow						£15	0	0

When the object is selling milk, a cow will make from 20*l.* to 26*l.* when the milk is sold at two-pence per quart ; but the expence of keeping is about one-third more than for the dairy.

SECT. III.—LAYING LAND TO GRASS.

THE most usual mode of laying land to grass, is with a crop of wheat after summer fallow upon clay soils and moist loams, and with a crop of barley after turnips upon dry soils ; if it be intended for permanent grass, it is

sown with 1 lb. of red clover*, 4 lbs. of white, 4 lbs. of yellow, 4 lbs. of rib-grass, and half a bushel of ray-grass per acre; as early in April as the season will permit.

Sir John Eden states, "That from repeated experience, he is fully satisfied that the best mode of laying down land to permanent grass, is by early ploughing in autumn, and frequent ploughing and cleaning next summer, and then to sow with new hay seeds, white clover, and rib-grass, the latter end of July." It is upwards of 45 years since he first tried this mode, and has ever since practised it with success.

The only instance I met with of any other grasses being sown, was at Mr Shaftoe's, of Whitworth, where I saw in 1808, a few acres in the front of his house laid down with *poa pratensis*, which was looking well in the middle of April, and then depastured with ewes and lambs. He had the seed from London, at 20s. per bushel.

At Sir Henry Vane Tempest's, at Wynyard, I was shewn a field that had been pared and burnt, and without any ploughing or other preparation (except spreading the ashes) was sown the latter end of July or beginning of August, with 1 bushel of ray grass seed, 7 or 8 lbs. of white clover, and 1 lb. of red clover. The first year's crop was depastured with different kinds of stock, but I was told that had it been depastured by sheep alone, it would have carried eight sheep an acre the first year, and three the second.

I recollect a similar experiment made upwards of

* The red clover is sown only to thicken the first year's crop.

30 years since, by the late Mr Dixon, of Cockfield, upon an old pasture of clayey soil, at Witton Park ; the first year it had an abundant crop of hay : the second year a good pasture ; but after that, it was a very bare pasture so long as I knew it.

At Mr Mason's, I was shewn a part of a field that had been well dunged for turnips ; a part adjoining was summer fallowed for wheat, one-half of which was covered with about 60 cart loads of earth per acre ; the other half had no earth or dung ; on this part, and that where the turnips were, the clover was gone off, and only a little ray grass remaining ; on the earthed part, both grass and clover were good, and treble the value to that on the other two parts. This experiment may be of use, where old tillage lands are intended to be laid to permanent grass.

An opinion has been entertained that lands which have been long used as nursery ground, to raise young trees, would be so much impoverished as to be of little value for any thing else : but this opinion seems not to be well founded ; as Mr Falla informs me, that in 1808, a piece of land that had been used as a nursery for upwards of 40 years, was well cleaned (after having a crop of pease) and manured with 20 cart loads of horse dung per acre, and sown with ray grass the 21st August : the produce in 1809, was upwards of three tons of hay per acre.

SECT. IV.—BREAKING UP GRASS LAND.

OLD grass lands are almost universally broken up by paring and burning. The first crop, turnips; the second, oats or barley; third, fallowed and limed for turnips; fourth, barley sown up with clover, and then goes on in the usual rotation.

If it be ploughed out without paring, it is mostly done in the beginning of winter. The first crop, oats; the second, fallow, limed for turnips, if dry land; third, barley, if not dry land the fallow is for wheat; fourth, clover, and comes then into regular rotation.

As to the rent given for permission, I have not heard of any particular case where it happened. It depends upon so many circumstances—as quality of soil, the length of term, nature of crops, and situation of other parts of the farm, to which such fields are attached, that no general conclusion can be drawn.

When a tenant is permitted to plough out an old grass field, it is generally attended with a condition, that some old tillage field shall be laid to grass in lieu of it.

CHAP. IX.

GARDENS AND ORCHARDS.

GARDENS in this district are very trifling, and the modes of management the same as in other places. The climate is not favourable for orchards, and the fruit grown is not nearly equal to the consumption, considerable quantities being imported. The rent of garden ground is from 4*l.* to 8*l.* an acre.

Mr Falla, of Gateshead, who has the most extensive nurseries in this and the adjoining counties, informs me that they have lately introduced the following new articles :—

Culinary Vegetables.

Purple cauliflower, a remarkably fine vegetable, requires exactly the same culture and protection as the white sort : they are in use at the same season ; but are very much superior in flavour.

The globe onion, known some years in Hertfordshire, is getting into use here, and there is no doubt will become

general on account both of its handsome shape, and superior good property of keeping well.

Hay's cockney potatoe, a very choice kind of early dwarf potatoe, introduced a few years since by Mr Falla; it is remarkably early, a fine eater, great bearer, and forces well.

Fruit Trees.

The *Kerwick white codling*, and *white hawthorn dene*, are almost the only kinds now planted, particularly where the produce is intended for sale; they are both great bearers, the latter a particularly handsome apple, and neither kind yet subject to the canker.

The *Manx codling*, a beautiful apple from the isle of Man (lately introduced by Mr Falla) which as a great bearer, promises to be equal, if not superior, to both the above; and like them, has no appearance of canker.

Ribston pippin, perhaps the first apple yet known in respect of *flavour*, when well ripened; it does not answer a good purpose here as a standard, nor bear well in that state oftener than once in five or six years, and is very subject to canker; but the case is otherwise in both respects, when planted against walls with a good aspect, and judiciously trained; it there becomes a first rate fruit.

Forest Trees.

Scampston elm, from a place of that name in Yorkshire, but supposed originally from America, a plant of wonderfully quick growth, has had shoots in one year from grafts five or six feet in length.

CHAP. X.

WOODS AND PLANTATIONS.

SECT. I.

THE best wooded part of this county, is the vale of Derwent, the soil of which seems peculiarly favourable to the production of wood, and particularly oak, and there are probably few places where it grows with more rapidity, or greater appearance of health. In the woods of Derwent, besides oak, are also found portions of ash, elm, birch, alder, &c. and also considerable quantities of underwood, particularly hazels.

Where the wood is principally oak, about 50 trees on an acre are left for timber, which are suffered to stand to about 60 years old; during which period subsequent thinnings take place. The value of these 50 oaks at that age, is estimated at 180/.

Where woods are well stocked with hazels, the produce in corf rods, * hoops for coopers, &c. will be worth on an average eight shillings per acre per annum.

* Corf rods are from half an inch to three-quarters in diameter, and used for making a kind of basket called corves, for drawing coals out of pits.

Where the wood is not principally oak, but consists of various kinds of trees, the general mode of management is to cut them at 18 or 20 years growth, at which age the value is about 50*l.* per acre. The produce in the eastern parts is chiefly applied to various uses about the collieries, as pit props, waggons, waggon-ways, &c. &c.

In the western parts, the application is mostly for the lead mines. George Hopper, Esq. of Black Hedley, informs me, that he has about 16 acres of natural wood, of which he cuts an acre yearly, and sells to the lead-mines, the average produce about 50*l.* a year.

Birch and alder are cut every 17 or 18 years, for lead mine wood, and are made up for different uses, according to sizes, and sold by what is here called a dozen, not of 12, but consisting of different numbers, and are classed and named as follows :—

<i>Names.</i>	<i>Number to a Dozen.</i>	<i>Length.</i>		<i>Diameters.</i>	
		<i>Feet</i>	<i>ins.</i>	<i>Ins.</i>	<i>Ins.</i>
Short Pollings	100	3	0	1½	to 2
Slider Pollings	24	4	9	1½	to 2
Sliders	10	5	3	3	to 3½
Forks	14	3	9	3½	
Level Wood	10	6	0	5	to 6

A dozen * is estimated as a load, to be carried on the backs of their carrying gallows.

* This dozen is probably a corruption of the French word *dosiere*, a bundle—originally a bundle for the back, from *dos*, the back.

A three horse cart carries 12 of these dozens.

The price in 1806, was 1s. 6d. per dozen.

in 1807, 2s. 0d. ditto.

I wished to obtain an account of all the oak woods that had been cut in the county, for the last thirty years, but some of the wood-mongers, who were best able to give the information, would not answer my enquiries.

Oak Woods cut.

1793 Shinkley Park Wood	Dean and Chapter
1796 Brissleton	Sir Ralph Milbanke
1798 West Auckland, partially	} Sir John Eden
Witton Castle, do.	
Marwood	J. T. H. Hopper, Esq.
	Lord Darlington
1800 Woodwell House	Sir Henry Vane
1803 Hoppel *	Dean and Chapter
1807 Hinden and Arngill	Lord Darlington
1808 Shinkley Wood	Dean and Chapter
Muggleswick Park, and Frankland	} Bishop of Durham
Castle Eden	
	Rowland Burdon, Esq.
1809 Long Acre Wood	Sir Tho. Liddell, Bart.

There have also been several other falls of oak timber at Ravensworth, Gibside, Old Axwell, Chopwell,

* This was large timber : six acres sold for 6,000l.

and other places up Derwent, &c. of which I could get no account.

The Oak Woods remaining uncut, are—

Gibside, about 100 acres
Ravensworth, ditto
Branspeth, a considerable quantity
Streatlam, ditto
Sellaby, about 30 acres
Belburn, 15 ditto
Lumley Crook, 15 ditto
Renton Park, 10 ditto
Painshaw Hole, 5 ditto
Newton Cap, 4 ditto

The prices of ash and oak wood per foot, and oak bark per ton, at different periods were—

	<i>Ash.</i>		<i>Oak.</i>		<i>Bark.</i>		
	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>Per ton on the tree.*</i>		
In 1789	1	4	1	6	5	0	0
1794	1	4	2	0	5	15	0
1799	1	6	2	6	6	0	0
1804	1	8	3	0	7	0	0
1808	2	3	3	6	12	0	0

* The prices of bark to the tanner would be nearly 4l. more, as the expences of peeling, drying, stacking, cleaning, &c. are generally estimated at about 4l. per ton.

SECT. II.—PLANTATIONS.

WITHIN the last sixty years plantations to a great extent have been made in this county, especially in the vicinity of gentlemen's seats. Sir John Eden, Bart. of Windleston, is one of the oldest planters, and having paid particular attention to it for upwards of fifty years, I was desirous of profiting by his long experience, and he has obligingly favoured me with the following observations :—

“ Nursery-men undertake to execute plantations at 6*l.* per acre ; but I have reason to believe they execute ill. Any gentleman who wishes to plant on a large scale, should appropriate a certain portion of ground for a nursery, and purchase seedling trees from nursery-men, of whom he may get 50,000 for 25*l.* and keep them two years regularly cleaned, and transplant them as may suit.

“ The best mode is to apportion a certain part of every new plantation for nursery ground, and as it is thinned, it becomes a part of the older plantation, and will in growth overtake it. By this means new plantations will be made at slight expence. I write from repeated experience, both upon Lord Eldon's and my own plantations.

“ The trees that seem to suit best with this part of the county of Durham, are oaks, sycamores, ash, alder, larch, beech, and elm ; but the two last require

“ shelter : the horn beam likewise grows well. The silver fir I prefer to any other tree.

“ All plantations should be originally planted thick, and the younger the trees the more sure to grow. In five or six years they will want to be thinned, but those taken out then may be transplanted.”

Sir John has planted much inferior land at Beamish, and is disposed to think that very bad land may be made more profitable by being planted, than in any other mode : he finds that it is a mistaken notion, that alders will only thrive on wet lands : they grow equally well elsewhere, and very fast, and for pit props come early to profit.

On the division of Lanchester Common, part of it was sold for defraying the expence of the division, making roads, and paying the damages occasioned by working mines ; Thomas White, Esq. purchased a considerable portion of these lands, of which he planted upwards of three hundred acres, the greatest part of it poor barren heath ; as these plantations have done very well, I took the liberty of addressing a few queries on the subject to Mr White, and of requesting his answers, which he has very obligingly complied with.

Query 1st. The expence per acre of first planting, and whether by pitting or otherwise ?

Respecting the expence of planting per acre, I must observe, that after I had completed the planting of this tract, now called Woodlands, I became a contractor, chiefly for such of my friends as employed me in my

profession of laying out grounds ; and for whom I have since planted, and renewed for three years, some thousand acres ; the price of which twenty years ago, was four pounds, but since the advance of labour, it is now six pounds per acre ; which work has always been performed by making pits of considerable dimensions, and with trees that have been in general previously transplanted in a nursery.

2nd. The number of trees planted per acre, and of what kinds, and best ages for planting of each kind ?

In respect to the number of trees per acre, I originally planted at three feet asunder, but have since found that four feet six inches distance, affords a sufficient quantity in any situation ; and the kinds of trees proper to be planted, the ground itself must direct : but at this place, which was in general of a barren quality, and in some parts swampy and rocky, I chose larches and firs, the former of which are most numerous ; but both in all situations should be planted as nurses, though when the ground is good and sheltered, the number of them need not be so great, but the ground filled up with oak, ash, beech, birch, elm, &c. : of these I have, amongst the resinous kinds planted considerable numbers, which in some places are doing very well ; as I have always been of opinion, that different kinds, of trees intermixed with each other, will not only afford more beauty to the eye, but will also, by extending their roots in their own natural direction, occupy different strata of the ground, and allow more trees to grow without interfering much with each other, as must be the case where the land is occu-

pied by one and the same kind; which subject is explained more at large in my Letter to the Society of Arts and Sciences, vol. v. page 10, of which I had the honour to be twenty years a member, and from whom I received nine gold, and two silver medals, on the subject of planting at this place.

The ages of the Scotch firs were two and three years old; larches and spruce firs, three and four; and the hard wood three, four, and five years, to suit the subject here to be planted, which being very poor, and much exposed, required all kinds as short as possible, provided the roots were good, which is the principal thing to be attended to.

3rd. At what age of the plantation is it best to begin thinning?

In answer to this, I must observe, that the first thinning must depend upon the progress the trees have made; which, if they have been planted about the distances I have described, viz: four feet six inches asunder, will in a general way, want thinning at the end of six or seven years.

4th. Value of first thinning, and expence of doing it?

I have found in this country, that the profit arising from this first operation, does little more than pay the expence, as the wood can only be used for shanks for brooms, hedge stakes, &c. the amount of doing which I cannot at this distance of time ascertain; but conclud

in many situations the wood will pay for itself, and where fuel is scarce, a considerable profit will arise from the brush-wood, in addition to the stem.

5th. At what distance of time from the first thinning do the subsequent ones take place, and the value and expence of each thinning?

In most plantations, the trees will vary in their growths, agreeable to the soil, and particularly the shelter of their situation, of which this place affords a great variety: in consequence of which, very few years had elapsed since the first thinning, before it was necessary, in particular parts of the ground, to weed out the redundant wood; as I have found, that thriving trees in general, under thirty years of age, double themselves every eight years; therefore such are the periods for thinning and pruning.

6th. To what purposes are the thinnings principally applied?

It must be observed, that in addition to the uses that the first thinnings were applied to, the trees taken down in this second weeding, when the wood was 14 or 15 years old, were sold for corf rods for coal baskets, glass posts for crates, for pit props, and many purposes in the lead mines.

The next eight years, making from 24 to 25 years, the firs and larches, besides answering all the above-mentioned purposes, became useful for spars, couples,

and joists for small buildings, &c, which I sold at eighteen-pence a cubic foot ; and for posts and rails for fencing, at *one penny per running foot*: the larches were useful also for gates, cart linings and framings, scaffold poles and ladders, &c.

Some birches were at this time taken down for pit props, being great tyrants to the neighbouring hard wood, by over-hanging them with their spreading tops.

The next eight years, making from 32 to 33 years, being as far as I can go from experience at this place, many of the larches and firs taken down, square 10 inches or a foot, which sell at two shillings per cubic foot, and are applicable to almost all purposes of building, as well as to those mentioned in the former years. The birches being the only hard wood which are large enough to be cut at this period, are useful for prop wood, mining ditto, clog soles, &c.

This fourth operation of thinning, leaves the trees at a considerable distance, so as to enable the remaining ones to grow to a large size, which, I think, ought, the next eight years, viz. at the age of 41, to be left at a timber distance, not containing more than 500 per acre, and which may grow so large, as to make 50 feet of wood per tree, perhaps much more ; the value of which will depend upon the times. It must here be observed, that as the Scotch firs have long ago answered their purpose as nurses, and are beginning to tyrannize over the hard wood, I have taken in some places most of them down, and shall continue to do so, except where left for ornament, by being mixed with other tints.

7th. The value, or probable value of an acre, at the following ages, viz. 20, 30, 40, and 50 years, including the value of the different thinnings?

I am sorry I have no documents by me, to fix the exact value of the wood, at the ages you mention; but I am certain, that at this period of 33 years, the profits from the thinnings have amply repaid the purchase money of the land; also all labour and other expences attending the execution of the work, together with interest.

8th. The kinds of trees generally left to stand for timber, when more thinnings are not thought necessary, and value per acre?

As firs, larches, and birches are the trees principally taken down, the kinds left after this 4th thinning would be, in a better soil than this, mostly oak, ash, beech, elm, &c.; but as larches were originally planted here in great numbers, as is before-mentioned, and are and will be the most profitable trees, they still compose much more than one-half of the quantity left, the value of which it is not in my power to estimate; but at the end of the next eight years, I expect the larches will produce such clean, well hearted, and durable timber, as to be equal, if not superior, to any foreign wood, and will arrive at a height to make masts for small vessels; and as they are known to resist the worm, will be excellent for

the outside coating of ships, which they have been long used for in Russia.

9th. The value of the land planted, or the rent it would have been let for when first planted?

I can convey no better idea of the value of the land, than by saying, that when in a state of common, covered with heath, without a tree or a bush upon it, the fee-simple of a very considerable part of that which is planted, cost me only one pound per acre.

CHAP. XI.

W A S T E S.

THE wastes in this county may be all comprehended under the denomination of heathy moors, there being scarcely any uninclosed grounds of any other description, and they are all situated to the western and mountainous part of the county, and with few exceptions, the greatest portion of them covered with heath (*erica vulgaris*) provincially "*ling.*" The present value of these heathy moors, taken in the aggregate, is not more than one shilling per acre. * The application of the greater part is principally to depasturing sheep of the heath or black-faced kind: a few young cattle and horses are also depastured upon them, by the adjoining farmers.

The greatest part of the improveable moors, fells, or commons, in this county, have been divided and inclosed: those remaining in a state of common, worth inclosing, are enumerated in chap. vi. page 96, and which would be improved by the same means as all the other commons that have been hitherto divided and inclosed.

* Mr Clark, of Bradley, in 1808, let 460 acres for 10*l.* 10*s.* or 6*d.* per acre.

CHAP. XII.

IMPROVEMENTS.

 SECT. I.—DRAINING.

DRAINING may be said to be a modern improvement in this county, as it is not much above thirty years since it became a practice in this district. Mr Baker and Mr Colling were the first who practised it to any great extent. The principles are now pretty well understood, and the practice is becoming very general.

I made frequent enquiries about Mr Elkington's draining, and found many had tried it without success: Mr Nesham and Mr Culley were the only persons that reaped any benefit from it. The former in draining a boggy field, by boring when they got into a quick-sand; and the latter in draining a morass, bored about ten feet deep, where there was not sufficient level to get through the moss: in some of those bore-holes the water ascended very copiously, but it has not had a general effect, as there are some parts of the swamp that yet remain imperfectly drained.

Open drains of about eighteen inches wide, and a foot deep, have been found beneficial upon heaths and wet mountain pastures.

Hollow draining is one of the greatest and most beneficial improvements of modern agriculture. The depth to which the drains are cut, must depend on the depth of the strata in which the water runs; but they are seldom cut less than three feet deep.

They are filled mostly with stones, were they can be obtained*, and generally laid in the conduit form, with two side stones and a cover, and small stones at the top; sometimes the drain is cut in the form of a V, and small stones thrown promiscuously into it: this is called a rumbling conduit.

The expence depends on the nature of the soil cut, and the facility or difficulty of procuring stones; and of course no accurate estimate of the expence can be given.

The benefit is such, that in many cases the superiority of the first year's crop has paid the expence; but in all cases the effects are so beneficial, that I never heard any one repent his having expended money in draining.

In May, 1809, the Rev. Mr Barrington, of Sedgefield, first introduced one of Mr Lambert's patent mole ploughs, which I saw at work in a poor stiff clayey field; it was drawn about 18 inches deep up every furrow, by one horse, and performed its work very well, though *very slowly*: in some places the water was coming to the surface, which we were told by the workmen was occasioned by the soil in those places (being a kind of sandy clay) running together after the plough had passed it,

* Where stones are scarce, tiles are used, made in the form of fig. 9, plate iv. The length 12 inches, breadth at the base 6 inches, and height 6 inches: the price 1s. 6d. per dozen.

any other :—First fold up a sod in a cylindrical form, and set it up edgeways as a central point; round this place other sods edgeways, close to one another, to form a circular bottom about three feet diameter; upon this, lay sods horizontally, either in a square or round form, to about three feet high, so as to leave a hollow like a chimney in the middle, about 12 inches diameter: in doing this, care should be taken to place the driest part of the sod inwards, and line the inside with the driest and roughest sods to be found; they are then fired at the top, and two or three sods laid over it: by this means the fire gets a sufficiency of air, and falling downwards, burns the bottom parts: in this way about one-fourth of the sods (the least dry) are left unheaped, and laid upon the hot ashes to dry and burn.

The season for paring is March, April, May, and part of June.

The crop generally taken after paring and burning, is turnips, sometimes rape, and mustard for seed. The land is ploughed thin and narrow, from two to three inches deep, and five or six inches wide: sometimes the land receives a second ploughing and harrowing, but I have seen many good crops of turnips with one ploughing, and the seed only brushed in with thorns.

The Expences are—

		L.	s.	d.
Paring, burning, and spreading	-	1	8	0
Two ploughings and harrowings	-	1	0	0
Seed and sowing	- - -	0	2	0
Hoeing	- - - - -	0	7	0
		£	2 17	0

The value of the crop will seldom be less than 5*l.* or 6*l.* an acre, which will in most cases be equal to the expences, and the rent of the land and taxes: the profits of course will be derived from the succeeding crops of oats, turnips, barley, and clover, which are all generally very abundant. If the land has been long in grass, the fallow for turnips ought to be limed: I have seen great crops of turnips got in this way, without any manure.

SECT. III.—MANURING.

MARL is very rarely met with in this county, and in such small quantities, that I have not met with one instance of its being used.

Chalk is not found here, but is sometimes brought as ballast in the coal ships for burning into lime. Sir

Thomas Liddell has been in the habit of doing this for some years past, for his estates at Ravensworth and Bradley.

Lime was formerly thought absolutely necessary to be laid upon every fallow; and he that neglected it, was deemed to be doing great injustice to his land: the quantity used, was two cart loads an acre; * but of late years a change of opinion has taken place, and there is now not one-fourth part of the lime used upon old tillage lands, that there was forty years since. When its utility became doubtful, by the crops being no better upon the limed lands than they were upon those parts of the field that had not been limed, it led to more accurate experiments, a few of which I shall mention.

Mr Buston, of Long Newton, has made experiments on lime for upwards of thirty years, by liming two ridges, and leaving two unlimed: he never saw any difference in the crop of wheat, nor any in the succeeding crops of clover and oats; the lime was from different places, as Oumby, Ayklea, and Carlbury: where the lime heap was laid on, no corn would grow for several years after: in some cases it extended to 20 years, and the place filled with quicken grass.

Mr Robert Colling used four sorts of lime one year at Dinsdale, viz:—Ayklea, Haughton Bank, Oumby, and Barton, and left two ridges unlimed: no difference appeared in the wheat crop between the limed lands and those which had no lime.

* If they laid on more, they said it would injure the crop.

Mr Bamlet, of Haverton Hill, once limed part of a field with lime, from near Hartlepool; the other part was unlimed: the crop on the unlimed, was much the best: the limed land had bad crops for two years after.

Mr Taylor, of St Helen's Auckland, tried three kinds of lime, viz:—Eldon, Broomdykes, and Grangehill, at the rate of four cart loads per acre, and a part much more abundantly: saw no sensible difference in any of the succeeding crops of wheat, clover, or oats.

Mr Mason, by desire of the Rusheyford Society, limed part of a field with six loads an acre; a part with three loads an acre; and another part had no lime. The unlimed part had much the best crop; where three loads were laid was the next best crop, and where six loads, the worst.

In order to ascertain whether a field I have in cultivation, had gotten a sufficiency of lime, I limed twenty yards in breadth along the top with four loads an acre, and left the next twenty yards unlimed; then limed another twenty yards in breadth, and left twenty yards unlimed, alternately to the bottom, which were all directly across the ridges, or at right angles to them. In the crop of turnips I could perceive no difference, nor any in the succeeding crops of wheat, clover, and oats.

The lime produced from the limestones which lie to the eastward of the coal district, when laid down in heaps previous to its being spread upon the fallow, renders the place where it laid, unproductive for several years, and for this reason is called the "*burning lime*."

But the lime to the westward of the coal district, produces no such effect upon the soil, and is hence called the "*mild lime*."

The following experiments were made, to try the effects of these different kinds of lime :

Mr Robert Colling limed one-half of a field with lime from Oumby, and the other half with lime from Barton, with the usual quantity of two loads per acre : the crop of wheat where limed with Barton lime, was three bushels per acre more than where limed with Oumby lime ; and the succeeding crops of clover and ray grass were much superior, as well as the oat crop after the clover.

Mr Middleton, of Summer House, in order to try the difference between Bowron lime (classed as mild lime) and that in his own neighbourhood, got two cart loads from Bowron, and spread one of them upon a quarter of an acre of a field in fallow, which had *lately been ploughed out from very old grass* ; he limed the remainder of the field with lime from Carlbury and Oumby : the part limed with Bowron lime was about eight or ten stooks * an acre more than where the other lime was used : he left a ridge unlimed, which had considerably the worst crop, and full of green heads when the wheat was cut.

The other load of Bowron lime was spread upon part of a field incumbent on limestone rock, which had been *repeatedly limed* for many years before : here he could not see the smallest difference in the crops.

Some years after this he tried Bowron lime again, upon other two places of a large field, and limed other parts with Summer House lime, and left other parts un-

* About eight or ten bushels per acre more.

limed between the limed parts: he could not perceive any difference in the crops between the parts limed and those unlimed.

His remarks on the above results were, that in the first experiment, where the Bowron lime had such a decided superiority, the land was fresh (that is, ploughed out lately from old grass) and had not been limed before; the other lands upon which it was laid, were old arable lands, that had been repeatedly limed, and lime of no kind produced any good effect upon them, and of course he has laid no lime upon them since; but upon land lately ploughed out from old grass, that wants lime, he gives a decided preference to Bowron lime.

The ridge that was not limed (in the first experiment) and had the worst crop upon it, clearly indicates that it wanted lime to make it productive.

Mr Walton, of Stanhope, uses from four to eight cart loads per acre of the mild lime; finds it very beneficial upon *fresh lands* (that had been long in grass) but of little or no use upon *old arable lands*, that have been repeatedly limed: he never observed any ill effects of the Weardale lime, where laid down in cart loads, even when a considerable quantity was left at the heap bottoms, except in the turnip crop, which always vegetates, but after they had got into rough leaf, generally turned sickly, and made little or no progress afterwards; but the succeeding crops appear more vigorous upon fresh lands in those particular places; which is a very different effect to what is produced by the lime of the eastern district.

From the above, and from the observations I have made on this subject for upwards of forty years, it ap-

pears that there is a certain quantity of lime necessary to bring soils into a due state of fertility; but when they are once saturated with lime, or have gotten a sufficient quantity, whatever is added more is of no use, and an unnecessary expence.

It is much to be lamented that this subject had not been earlier and more extensively investigated, as it would have saved an immense sum of money, that has been literally thrown away, in the purchase and application of an article that was of no use, and in many cases detrimental.

The effects produced by the lime of the eastern and western districts being so very different, I wished to ascertain their component parts, by chemical analysis, from which the *cause* might probably be determined, and the farmer have a criterion to guide him in the choice of his lime. For this purpose I applied to my friend, the Rev. Mr Turner, of Newcastle, who with his usual readiness to promote every scientific pursuit, obligingly undertook to analyse two of each kind: he was prevented by indisposition from completing it as he wished, but he clearly ascertained that the unfertile limestone contained magnesia, † and that the mild ones did not.

† Smithson Tenant, Esq. I believe, was the first that discovered the presence of magnesia in limestones, and suggested that the inferiority of limestone containing magnesia, for agricultural purposes, was most probably owing to this substance in combination with calcareous earth, &c.

Extract from Mr Turner's Letter.

“ I took 100 grains of each kind of limestone, and,
“ poured upon them by degrees an ounce measure of
“ strong sulphuric acid, intending the next day to evapo-
“ rate the contents to dryness on a sand bath, but hav-
“ ing been seized with a severe indisposition, which
“ confined me near a month, I had no opportunity of
“ going on with the experiment. In the mean time the
“ Oumby and the Carlbury stones had completely ab-
“ sorbed all moisture, and on the latter there lay a quan-
“ tity of small prismatic crystals, which on being ap-
“ plied to the tongue, had evidently the harsh bitter
“ taste of Epsom salt: the other two, namely, the Bar-
“ ton and the Bowron limestone, had a good deal of the
“ acid remaining over them.

“ I then repeatedly filled up the glasses with water, let-
“ ting them stand each time till the following morning,
“ and decanting the liquor from the sediment till it came
“ off without taste. It was obvious that supposing any
“ magnesia to have formed a constituent part of any of
“ the limestones, these liquors must contain in solution,
“ all the sulphate of magnesia (Epsom salt) together
“ with a small portion of sulphate of lime (gypsum) which
“ is scarcely at all soluble in water. Accordingly I ob-
“ served that in the two glasses which had become dry
“ on the first effusion of water, there rose up in the
“ sides of the glasses a saline vegetation of small prisma-
“ tic crystals, or ‘ Epsom salt.’ Of the water obtained
“ by the repeated washings, that from No. 1, Bowron
“ limestone, was quite sour, and instantly reddened the

“ test paper. No. 2, Barton, was sourish, and after some
“ time turned the paper red. No. 3, Oumby marl, was
“ harsh, but had no perceptible sour taste, yet spotted
“ the paper here and there. No. 4, the Carlbury, was
“ quite bitter, and did not at all affect the paper.

“ It is also worthy of remark, that the quantity of
“ sediment or indissoluble substance was greatest in No.
“ 1, and progressively less to No. 4, which therefore
“ may be concluded to contain the greatest quantity of
“ the more soluble magnesian earth.

“ In order, however, to ascertain more fully the
“ presence of magnesian earth, I added to each by de-
“ grees, a quantity of the solution of carbonate of potash,
“ which having a greater affinity for the acid than mag-
“ nesia, would instantly precipitate the magnesia con-
“ tained in the liquor, in the form of thick white flakes ;
“ whereas if the liquor contained nothing but sulphate
“ of lime, the very small quantity of this salt held in
“ solution, would produce only a slight milkiness. I
“ found accordingly this effect produced on No. 1 ; in
“ No. 2, a slight precipitation ; but in 3, and especially
“ in 4, a copious fall of white flakes.

“ I did not ascertain the weight of dried precipitate in
“ each glass, because from unavoidable circumstances the
“ former part of the experiment had been imperfect ;
“ but the experiment thus imperfectly performed, ap-
“ pears sufficient to shew that the quantity of magnesia
“ is proportionate to the bad character of the limetone.”

I have also been favoured with the following very ac-
curate analysis, by the Rev. Mr James Holmes, Fellow
of Peter House, Cambridge :

Oumby. 100 grains.

Lime	-	-	-	31.700
Magnesia	-	-	-	19.800
Carbonic acid	-	-	-	47.500
Red oxide of iron	-	-	-	0.500
Water	-	-	-	0.500
Total				100.000

Carlbury. Bottom of quarry. 100 grains.

Lime	-	-	-	33.4440
Magnesia	-	-	-	17.9300
Carbonic acid	-	-	-	46.5000
Red oxide of iron	-	-	-	1.6260
Water	-	-	-	0.5000
Total				100.0000

Denton. Bottom of quarry. 100 grains.

Lime	-	-	-	35.4948
Magnesia	-	-	-	16.0052
Carbonic acid	-	-	-	46.0000
Alumina, bitumen and red oxide of iron	-	-	-	2.2500
Water	-	-	-	0.2500
Total				100.0000

Middleton Tyas.

Lime	-	51.8854	} 92.1875 carbonate of lime
Carbonic acid		40.3021	
Silica	-	5.8750	} 7.8125 residuum
Alumina	-	1.15625	
Water	-	0.78125	
Grains		100.00000	

Through the means of Sir John Sinclair, I have obtained the following

*" Analysis of Limestones, made in the Laboratory of the
" Royal Institution, by Mr Davy.*

*" No. 1. Frosterley. 100 grains, after being re-
" duced to a fine powder, were acted on by dilute mu-
" riatic acid; the mixture was filtered; the insoluble
" matter that remained weighed when dry, three
" grains; prussiate of potash occasioned a slight pre-
" cipitate; by saturating the solution with carbonate
" of potash, a precipitate was formed that weighed
" when dry, 96 grains; the remaining liquid was boiled
" for more than a quarter of an hour, without becoming
" turbid; it contained therefore no magnesia. The 96
" grains were digested in pure potash, and when well
" washed and dried, were found to have lost nothing of
" their original weight: hence free from alumina.*

Composition.				<i>Grains.</i>
Carbonate of lime	-			96
Residuum	-	-		3
A small quantity of iron				1
				100

" No. 2. *Bowron.* 100 grains treated as the last,
" were found to consist of

					<i>Grains.</i>
Carbonate of lime	-	-	-		91
Residuum	-	-	-	-	8.5
Iron	-	-	-	-	0.5
					100.0

" No. 3. *Barton.* 100 grains treated as the former,
" composed of

					<i>Grains.</i>
Carbonate of lime	-	-	-		94
Residuum	-	-	-	-	5
Iron	-	-	-	-	1
					100

" No. 4. *Eldon*. 100 grains examined by the same tests as the first, composed of

	Grains.
Carbonate of lime - - -	46
Carbonate of magnesia - -	40
Iron - - - -	1
Residuum - - - -	1.5
	88.5

" No. 5. *Ayklea*. 100 grains treated as the last, composed of

	Grains.
Carbonate of lime - - - -	44
Dirto of magnesia - - - -	42
Iron - - - - -	1.5
Residuum - - - - -	2.5
	90.0

In No. 4, there is a deficiency of $11\frac{1}{2}$ grains; and in No. 5, of 10 grains, not accounted for.

In the course of the last two months the Rev. W. Turner has gone through a fresh set of experiments, with a view to ascertain the quantity of magnesia in several of the Durham limestones, according to the directions of Klaproth, reported by Dr Henry, viz: " On 100 grains of the fine powder pour half an ounce " of concentrated sulphuric acid; when the effervescence

“ has ceased, evaporate to dryness in a sand bath ; add
 “ to the residuum a quantity of distilled water, and hav-
 “ ing allowed it to stand some time, decant it off from
 “ the sediment ; to this liquor add a solution of carbonate
 “ of potash ; when, if there be magnesia, it will be pre-
 “ cipitated in white flakes ; if none, there will be only
 “ a slight milkiness. Carefully dry and weigh the pre-
 “ cipitate, and you will have the proportion of carbonate
 “ of magnesia in 100 grains of the limestone.”

The result was—

In Oumby marl	-	-	37 grs.
Oumby stone	-	-	32 grs.
Peircebridge	-	-	21 grs.
Easa Bank	-	-	11 grs.
Barton	-	-	none, or very trifling.

By the above analysis, the following particulars of the component parts of limestone from different quarries, are obtained :

By Mr Holmes's analysis—

<i>Names of Quarries</i>	<i>Lime.</i>	<i>Magne- sia,</i>	<i>Carbo- nic acid,</i>	<i>Resi- dum.</i>
Oumby contains	31.70	19.80	47.5	1.0
Carlbury	31.44	17.93	46.5	2.1
Denton	35.50	16.00	46.0	2.5
Middleton Tyas	51.88	0.00	40.30	7.82

By Mr Davy's.

<i>Names of Quarries.</i>	<i>Carbonate of Lime.</i>	<i>Carbonate of Magnesia.</i>	<i>Residuum.</i>
Eldon contains	46	40	14
Ayklea	44	42	14
Bowron	91	0	9
Middleton Tyas	92	0	8
Barton	94	0	6
Frosterley	96	0	4

These analyses, made by three different gentlemen, and by different modes, all concur in one general result, viz. : that the limestones to the east of the coal district, (known to the practical farmer under the denomination of *hot or burning lime*,) contain a large portion of magnesia; and those to the west of the coal district, denominated *mild limes*, are perfectly free from magnesia :

hence the cause of the very different effects of those two varieties of limestone is now clearly ascertained to be, *lime combined with magnesia ; and lime perfectly free from magnesia :* and the good or bad character of the limestone seems to be in proportion to the quantity of magnesia contained in it.

Of the mild limestones, Frosterley, by the above analysis, is the purest, as it contains 96 of carbonate of lime, and only 4 of residuum ; and of the hot or burning limes, Oumby and Ayklea appear to be the worst, or to contain the least quantity of lime, and the most magnesia ; the latter containing only 44 of carbonate of lime, which is less than half the quantity of lime contained in the Frosterley limestone : but the good or ill effects do not seem to depend on the quantity of lime or calcareous earth, but upon the quantity of magnesia combined with it.

Gypsum was tried once by Mr Robert Colling on a crop of barley, but he could not perceive any effect : Mr Charles Colling also tried it with similar results.

Sea weed is carefully collected all along the sea coast, and laid upon grass land, fresh from the shore, with great effect.

Yard Dung. I have not met with any comparative experiments between long fresh yard dung, and rotten ; but it seems a general opinion, that fold-yard dung is in the best state when neither too fresh nor too rotten, which is after the first fermentation has nearly ceased.

Composts.

In the vicinity of Newcastle they cut small sods with a plough, out of every furrow upon their moist grass lands, and make these sods into compost with dung, which they lay upon their grass lands with good effect.

Mr Taylor, when at Bishop Middleham, mixed moss and lime : his account of it is as follows :

‘ This compost was of lime and decayed vegetable matter, cut out in draining a bog, the scite of an old pond of about 30 acres : when mixed and mellowed, after frequent turnings, for two, three, and five years, (for some was not ready till then,) it was applied chiefly on the fallows of old worn tillage land, of a light nature : in one field two ridges were covered with compost, and two missed, alternately ; in two others it was applied on three acres of each across the fields, and the remainder left without any dressing, like the two alternate ridges above-mentioned : about 30 loads were spread pretty thick, on a sandy soiled grass field, but all without any apparent effect : the lime was from a quarry in the same farm, whence large quantities are carried every season to a great distance in Cleveland, for the purposes of agriculture.’

Ploughing in green crops is not a practice of this district : I only find one instance of Mr Colling partly eating a field of tares with sheep in August : the tares being left very rough upon it, and trodden down by the sheep, it was ploughed in September, and sown with wheat : the crop good.

SECT. IV.—IRRIGATION.

THIS practice is very little known here : the late Mr Matthew Culley, I believe was the first that attempted it in catch work watering, at Denton. On his removing from thence into Northumberland, it was discontinued : in 1804, he made some upon a regular plan, but the land being very good, the tenant thought it of more value to employ it otherwise, and the meadows are again abandoned.

The first regular watered meadow of ridge work, and the only one I believe at present in the county, is one I made at Summer House in 1792 : the field contained about 10 acres of old grass, the surface flat, and soil a thin moist loam on clay. The mode we took in constructing it, was first to pare it with a plough about two inches thick ; the sods were cut into proper lengths, and rolled up ; the ridges being set out of the size intended, were ploughed, and formed by the spade to a proper slope ; the sods were then laid down again, and the water turned upon them, to give them a sufficiency of moisture, to make them grow, as the weather was dry : the expence was about 5*l.* per acre : this answered so well, that the tenant a few years after requested to have the field below converted into a watered meadow, which makes in the whole about 20 acres.

The water is from a small rivulet ; a part of it formed by springs from the limestone quarries above.

They begin to water in October, and continue

through the winter: the meadows are eaten in the spring by cattle, to about the middle of May, when they are saved for hay, and the aftermath is eaten by cattle; for if eaten by sheep, it would inevitably rot them.

CHAP. XIII.

EMBANKMENTS.

THE first embankment attempted in this county, was made by Mr Kenderley, about the year 1740, to secure the lands of Saltholm, near the Tees Mouth, from being overflowed by the tide.

The dimensions of his first bank were from 18 to 24 feet in the base, and from 5 to 7 in height, according to the level of the ground.

In 1771, a very high tide, with the wind at north or north-west, made a breach, and destroyed about 400 yards of the original bank, which was replaced by one of larger dimensions, viz: 36 feet base, and 8 feet high, which cost from 35s. to 42s. per rood: this was placed within where the old bank stood.

In the autumn of 1807, there were some remarkably high tides, that made several breaches in this embankment, which were repaired before winter, and a new one at some distance within the old one, was making in April, 1808, of much larger dimensions, viz: 60 feet base, and 9 feet high, which cost 5*l.* per rood (of 7 yards) or nearly sixpence a cubic yard. The whole length of

bank is about four miles for Saltholm and Billingham Marsh: the quantity of land secured is—

600 acres	Saltholm
300 do.	Billingham
500 do.	Cowpen

A considerable portion of Saltholm is in arable, and ranks with the most fertile lands in the county: the remainder is pasture, into which stints from the 12th of May to the 10th of October, are taken at the following prices, viz:—

				£.	s.	d.
A horse	-	-	-	5	5	0
Cattle 3 years old	-	-	-	3	10	0
Ditto 2 ditto	-	-	-	2	12	0
Ditto 1 ditto	-	-	-	1	15	0

In 1800, Mr Bamlett, of Haverton Hill inclosed above 60 acres, which cost 900*l.*: the dimensions of his bank were from 40 to 45 feet in the base; and the height from 7½ to 10 feet: the prices for making from 20*s.* to 31*s.* per rood:

This land was overflowed by almost every tide, and much broken: the soil is all alluvial, and the fertility such, that the following crops have been taken:—1st, rape; 2nd, rape; 3rd, oats; 4th, oats; 5th, barley; 6th, oats; 7th, barley; all of them most luxuriant. The intended rotation is now to be—1st, fallow for rape; 2nd, barley; 3rd, drilled beans; 4th, wheat; 5th, oats.

There are several other smaller embankments from

hence to above Stockton, wherever the tide overflows the holms adjoining the river.

The form of all these embankments is represented in Fig. 3, plate 5. The side AB, next the river, makes an angle with the horizon of about, 15 degrees; and the side CD, next the land, 45 degrees.

The earth of which they are formed, is dug from a ditch I, in the front, and also from a ditch EFGH, made on the inside of the bank, which receives the rain or surface water, and retains it while the tide is up, and the sluice stopped *; the front AB, is covered with sods pared from the adjoining lands.

There are also several embankments made within the last 30 years, on the upper parts both of the Tees and the Wear, to prevent floods from getting over the low grounds † adjoining them.

Sluices.

The sluices for letting off rain or snow water, &c. from the embanked land, are made and arched with bricks about 2½ feet square; the outside has a perpendicular door D, fig. 4, plate 5, hung on hinges at the

* In summer this ditch is filled with fresh water (for the use of the cattle) from Greatham Beck, by a sluice that dams the water sufficiently high to cause it to run into this ditch.

† These low grounds are called holms on the Tees; batts and haughs on the Wear; and haughs on the Tyne and Derwent.

top, which when pressed with water from the outside, falls against the perpendicular cheeks C, and effectually prevents the water from entering while the tide is up; when the tide has retired, the water accumulated in the ditch EFGH, fig. 3, plate 5, presses against the inside of the door, and opens it a sufficient width to let the water run out before the return of next tide.

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CHAP. XIV.

LIVE STOCK.

SECT. I.—CATTLE.

THE cattle bred in this county have for a great number of years been of the short-horned kind, the best variety of which, having been long found on both sides of the river Tees, have for a great many years been known by the appellation of

The Tees Water Breed.

An attempt to improve them, (which I suspect was more with regard to size, than any other quality,) was made by Mr Michael Dobinson, of the Isle, near Sedgfield, who brought a bull out of Holland, that is said to have improved the breed. A few years after some other adventurers went over to Holland, and as *great bulk*, was then considered as the criterion of perfection, they brought home a complete livery animal, with immense buttocks, which did a great deal of mischief; but there were some intelligent breeders that steered clear of this

evil * ; and from them the pure Tees Water breed has descended to the present time, in which were united the properties of feeding to great weights, and being great milkers.

The visitants of Mr Bakewell having seen what he had done with the long horns, by selection ; and at how much earlier ages they got fattened, were induced to try what could be done by similar means, with the short horns ; and several selections were made for this purpose with great success.

The first particular recorded instance of the Tees Water breed, for fat and great weight, was an ox of Mr Hill's, of Blackwell, which was killed at Darlington the 17th December, 1779, at seven years old ; the particulars of his weight are as follow :

					<i>sts.</i>	<i>lbs.</i>
Two fore quarters	-	-	-		75	7
Two hind ditto	-	-	-		76	3
Carcase	-	-	-	-	151	10
Tallow	-	-	-	-	11	0
				Total	162	10

* Of these, Mr Milbank, of Barningham, and Mr Croft, of Barford, were the most eminent—and were considered as having the best and purest breed of the district at that period, (about 70 years since :) the colours of their cattle were red and white ; and white with a little red about the neck, or roan.

This information was communicated by Mr Thomas Corner, now

The next was a five years old ox, of Mr Milbank, of Barningham, killed at Barnardcastle in April, 1789: he weighed—

				str.	lbs.
Two fore quarters	-	-	-	74	8½
Two hind ditto	-	-	-	75	10
Carcase	-	-	-	150	4½
Tallow	-	-	-	16	0
				166	4½

This ox being at five years old only 1 st. 5½ lbs. less than Mr Hill's ox in weight of carcase, and having five stones more tallow, was certainly of a superior breed for fattening at an early age; and most probably was descended from the breed mentioned by Mr Corner.

At that period it was thought that no ox could be made properly fat under five years old; and I remember going in the year 1786, to see as a curiosity, a steer 3½ years old, of Mr Robinson's, of Hutton, that was supposed to weigh 80 stones, and had been sold for 20l.* But to select a variety to fatten at a much earlier age than had ever yet been obtained, was left to the breeders of the present day to accomplish, who had the judgment to select, what accident threw in their way.

near 90 years of age: and Mr George Culley says, that he has repeatedly heard his father state the same particulars.

The colours of the above being similar to those of the present improved breed of short horns, makes it probable that they are descendants of the same race.

* Five shillings a stone was a great price at that time.

In the spring of the year, Mr Basnett, of Darlington, purchased a cow, with a bull calf at her foot, and putting her into a good pasture, she got so fat, it induced him to dispose of her to a butcher in the August following, and the calf was sold to a farmer in the neighbourhood. At four years old he was purchased by Mr Robert Colling, and Mr Waistell, of Alihill, who at that time did not keep a bull for any other purpose than serving their feeding cows; but Mr Colling finding him have a great propensity to get fat, sold him to his brother Charles Colling, who was then beginning to breed, and anxious of selecting those with the best dispositions to fatten: for the same reasons, and with the same view, he soon after purchased of Mr Maynard, of Ayreholm, a cow, and a heifer, her daughter.

This bull and cow, selected with so much judgment, are the original stock from which the celebrated Durham Ox, and the justly acknowledged superior breeds in the possession of Mr Charles Colling, Mr Robert Colling, and Mr Christopher Mason, are descended.

Messrs Collings have frequently sold cows and heifers for 100*l*. and bull calves at 100*l*. Mr Charles Colling has refused 500*l*. for a cow; and in 1807, Mr Mason refused 700 guineas for a cow.

These gentlemen let bulls out by the year: the prices from 50 to 100 guineas; and the public are so fully convinced of their merits, that these celebrated breeders cannot supply the demand from the PURE BLOOD, which they are as cautious of preserving, as the amateurs of the turf are the breeds of their race horses, and which the takers of bulls are become so well acquainted with, that the prices they give, are in proportion to the good quali-

ties of the individuals, and merits of their progenitors—more regard being paid to their pedigree than to any thing else ; for this purpose they have books containing the full pedigree of their stock, similar to the stud book of race horses, by which any person wanting to purchase any of their stock, or to hire bulls, may see how they are descended.

Of the surprizingly fat individuals of this variety, numerous instances might be produced : I shall select one most deserving of notice, and well known in most parts of the kingdom by the name of

The Durham Ox ;

Was bred by Mr Charles Colling, of Ketton, in the year 1796 : his form and nice handling, indicated every disposition to fatten at an early age, and the expectations entertained of him by the best judges, were not disappointed : at five years old he was not only covered thick with fat upon all the principal points, but his whole carcase in a manner loaded with it, and was then thought so wonderful an animal, and so far exceeding whatever had been seen before, that he was purchased to be exhibited as a show, by Mr Bulmer, of Harmby, near Be-dale, in February, 1801, for 140*l.* : at this time he was thought to weigh 168 stones, his live weight being 216 stones, (14 lbs. to the stone) : this did not arise from his superior size, as will be seen on comparison in the following table containing



THE DURHAM OX,
BRED BY MR CHARLES COLLING.

The Dimensions of great weighted Oxen.

Names of Oxen.	Age horns to rump.	Length from			Height at			Girths at			Breasts at			Weights of		
		Ft.	In.	from ground.	Cropt.	Loins.	Breast from ground.	Cropt.	Belly.	Loins.	Hipt.	Shoulder	Carcass.	Tallow.	Hide.	
Blackwell	6	9	5½	6 0	5 8	2 1	10 6	Ft. Ins.	Ft. Ins.	Ft. Ins.	Ft. Ins.	sts.	lbs.	sts.	lbs.	
Howick Red	7	9	4	6 0	5 10	1 11½	10 0	10 8	10 1	2 10	2 9	152 9	16 7	9 2		
Ditto Mottled	7	9	8	5 10	5 9½	1 7	9 8	10 10	9 10	2 11	2 7	152 8	16 0	9 11		
Barningham	5											150 4	16 0	9 2		
Mr Charge's	7	8	2	6 2		1 8	10 7	10 8	10 10	2 9	3 0½	168 10	13 0			
Mr Colling's	5	8	4	5 3	5 5	1 6	10 0	10 2	10 2	2 7	2 7	168 0				
Ditto	10											220 0				

Mr Bulmer got a proper carriage made to convey him in, and after travelling with him five weeks, sold him and the carriage at Rotheram, to Mr John Day,

	£.	s.	d.
On the 4th of May, 1801, for	250	0	0
On the 14th May, Mr Day could have sold him for - - -	525	0	0
On the 13th June, for - - -	1000	0	0
On the 8th July, for - - -	2000	0	0

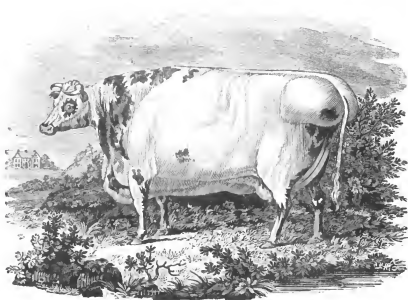
Mr Day preferred keeping him, persuaded that his merits were such, as would ensure him a greater return : but these prices are strong proofs of his very superior excellence, to whatever had been seen in those districts before.

Mr Day travelled with him nearly six years, through the principal parts of England and Scotland, and arrived at Oxford, in February, 1807, where on the 19th, the ox by accident dislocated his hip bone, and continued in that state until the 15th April, when he was obliged to be killed ; and notwithstanding he must have lost considerably in weight, during this eight weeks of illness, yet his carcase weighed

	sts.	lbs.	
Four quarters	165	12	(14lbs. to the stone.)
Tallow	11	12	
Hide	10	2 *	

* From Mr Day's pamphlet, giving an account of this ox, the places he was shewn at, and distance travelled, during the time he was in his possession.





MR MASON'S COW.



This was his weight at 11 years old, under all the disadvantages of six years travelling in a jolting carriage, and eight weeks of painful illness: had he been kept quietly at Ketton, and properly fed until seven years old, there is little doubt but he would have weighed more than he did at ten years old, at which age Mr Day states his live weight to be nearly 34 cwt. or 270 stones. From which if there be taken for offal 50 ditto.

Leaves the weight of the carcase 220 stones.

Mr Charge's ox was of the same breed as the Durham ox, being descended from a bull of Mr Charles Colling's: he had been unwell for some time before he was killed, which reduced his weight considerably, at least 8 or 10 stones.

As a specimen of a female of this family, I shall select a near relation of the ox,

A Cow of Mr Mason's, of Ebilton,

In point of fat, not less remarkable than the ox. When I saw her in 1808, the depth of fat from her rumps to her hips, in a perpendicular position, was not less than 12 inches; upon her loins and crop, not less than 10 inches; and the shoulder score at least 9 inches thick.

Mr Robert Colling has a white heifer four years old, a perfect counter part of his brother Charles's ox; being, like him, completely covered over her whole carcase with fat: she is estimated to weigh 130 stones.

Of the aptitude to fatten at an early age, I shall select a few instances.

Mr Robert Colling sold in Darlington market, the 18th of April, 1808, a two-years old ox for 22*l.* sup-

posed to weigh 63 stones : the price of fat stock at that time being 7*s.* per stone.

A few days before this, I saw at Mr Nesham's, of Houghton-le-Spring, an ox two years old in March, 1808, (bred from Mr Mason's stock,) completely covered with fat over his whole carcass, and supposed to be the fattest ox of his age ever seen : butchers estimated him to weigh 75 stones. Neither of these animals were of large size, and would not have weighed above 40 stones, had they been no fatter than are usually killed for the markets.

Mr Wetherill, of Field House, sold at the fair in Darlington, the first Monday in March, 1810, two oxen under three years old, for 47*l.* 10*s.* each. The price of fat cattle at this fair was about ten shillings a stone.

Mr Arrowsmith, of Ferryhill, has for seven years back fed his two-year olds, and sold them to the butchers as follows :

		<i>£.</i>	<i>s.</i>	<i>d.</i>	
In 1801,	sold 4 for 25	0	0	each.	2 stots and 2 heifers.
1802,	6 for 17	10	0	each.	3 stots and 3 heifers.
1803,	4 for 17	0	0	each.	
1804,	6 for 18	10	0	each.	
1805,	6 for 17	10	0	each.	2 stots and 4 heifers.
1806,	4 for 16	0	0	each.	
1807,	8 for 18	0	0	each.	
1808,	8 for 19	0	0	each.	

The time of selling, from the beginning to the latter end of May.

Their management is as follows : In the first winter they get straw in a fold yard, with nearly as many turnips as they can eat ; in May they are turned to grass ; in November put to turnips through the winter ; and turned out to grass the first week in May.

In 1807 and 1808, on account of turnips being scarce and dear, they had four cwts each of oil cake, from about Candlemas : the price of four cwts of cake about 3*l*.

A twin heifer calved the last week in April, being kept the first year the same as the common stock, was entered for a sweepstakes to be shewn in June, when two years old, and was then put to grass with other stock of the same age in the usual pasture ; in November she was estimated to weigh 28 stones, when she was put to ruta бага, and hay, and oil cake, of which she eat four cwts, and two bushels of bean meal, and one bushel of barley : went to grass the first of May, and had no oil cake afterwards. On the 3rd of July, when she was shewn, it was the unanimous opinion of the best judges, that she weighed 58 or 60 stones, having gained 30 stones in 30 weeks.

In April, 1808, I saw eight yearlings, intended for the same course of feeding : they were then *very lean*, not more than 15 stones each ; and had they been offered for sale in a fair, no person unacquainted with the breed, would have given more for them than 4*l*. 10*s*. or 5*l*. per head.

Mr Walton, of Middleton, in Teesdale, has for the last six years sold his oxen about midsummer, 2½ years old, for 20*l*. to 21*l*. each ; their weight from 50 to 54 stones.

Their keeping is as follows : the cows seldom calve

sooner than April; the calves get new milk for the first three weeks, after that a moderate quantity of scalded skimmed milk, mixt with oil cake boiled in water, about two quarts of each, along with good hay, for about six weeks; after which they do very well in the pastures without any kind of hand feeding, until the latter end of November, when they are tied up, and fed with straw and turnips until the beginning of April, from which time they get hay till the pastures are ready. The mode of proceeding is exactly the same through the next year, to the time of selling: they never get oil cake or corn.

Mr Walton has great merit in improving the stock of this district, which was uncommonly bad before he began to hire bulls of Mr Mason, and to purchase cows of the improved breed.

He sometimes buys in calves of the unimproved or old breed of the country, and finds that his own, at two years old, get fatter and fitter for the butcher than the others do at three, though kept and fed exactly alike.

It is a common practice among the breeders of the improved short horns, and which I first observed at Mr Wetherill's, of Field House, near Darlington, to put the year old heifers to the bull the beginning of July, so as to calve not later than the middle of May: the calves run with, and suck their dams, until August; the cows are then put upon fog, fed through the winter with turnips, and sold to the butchers in May and June following, for 25*l.* on an average, which, with the value of the calf, cannot be reckoned at less than 30*l.* for a three years old heifer.

It has been already stated, that the short horned cattle were great milkers: this cannot be said of the variety

which has such an aptitude to fatten, for though they give a great quantity for some time after calving, they decline considerably afterwards; but the variety of great milkers is yet to be found, wherever the dairy is the chief object, and this variety is as carefully preserved and pursued, as the graziers do that of the fatting tribe. It is very common for cows of this breed in the beginning of summer to give thirty quarts a day, and there are particular instances of more. Where the object is selling milk, they are probably superior to any breed in the kingdom; but in respect to butter and cheese, there are some doubts whether they are entitled to claim a superiority or not, as the quantity of those articles does not depend on the quantity of milk.

I was informed by Mr Walton, of Stanhope, that Mrs Watson, near that place, got two ounces of butter from a quart of kyloe milk, which is nearly double the quantity that she obtained from a quart of milk of the short horned breed. Mr Thomas Bates, of Halton, made similar experiments, and got two ounces from a quart of kyloe milk, and one ounce from the same measure of short horned milk.

The above induced Mr Walton to make similar experiments on a quart of milk of each of six cows, which produced as follows:

	<i>ozs. drs.</i>	
No. 1. - - - -	3	0
2. - - - -	1	6
3. - - - -	1	12
4. - - - -	1	10
5. - - - -	1	14
6. - - - -	1	6

The quantity from No. 1 being so great, he had it tried a second time, with the same result. No. 1 is six years old, and the others only two years old, which he thinks in some measure accounts for the difference in quantity; as he is told that the produce of butter increases with their age to a certain period; and it is very probable the above two years old cows would when three and four years old, give upwards of two ounces of butter per quart, or more than the kyloe milk. The difference between this experiment and those of Mrs Watson's and Mr Bates's, may be owing to the breed, Mr Walton's being of the improved short horns, and the others of the great milking tribe. This is a subject well worthy of further and more accurate investigation.

Crosses.

Mr Robert Colling has frequently crossed with the improved short horned bulls, and the best kyloe cows he could procure: the produce made very fat, and much earlier than the pure kyloe; but he has now given it up, finding that the pure improved short horns are more profitable.

Devonshires.

In the autumn of the year 1805, Mr George Taylor, of St. Helen's Auckland, went purposely into Devonshire, to procure some of the best of this breed he could find: for this purpose he traversed the whole county, and selected ten cows and a bull, which he got home in

December, 1805. There has not yet been time for making fair comparisons between them and the improved short horns. In April, 1808, I saw a two years old stot very fat, fed from a calf, which appeared so very little, that some people thought he would not weigh more than 25 stones, but butchers would have purchased him at the rate of 40 stones. In May, 1809, I saw him again : his weight was then estimated at 64 stones. He was killed the beginning of March, 1810, at 3 years and 10 months old.

His live weight was	-	-	-	sts.	lbs.	114	0
				sts.	lbs.		
Tallow	-	-	-	10	6		
Hide	-	-	-	6	3		
Head and tongue	-	-	-	2	9		
Heart, liver, and lungs	-	-	-	2	7		
Feet	-	-	-	1	4		
Entrails and blood	-	-	-	11	13		
Offals	-	-	-	-	-	35	0
Carcase, or four quarters	-	-	-	-	-	79	0

And the proportion of carcase to 10 stones of live weight, is 6 sts. 13 lbs. or as 1 to 0.693.

His dimensions were—

			<i>Ft. ins.</i>
Height at the shoulder	-	-	4 0
Ditto of breast from ground	-	-	1 7½
Girt behind the shoulder	-	-	7 3
Ditto, at loins	-	-	8 8
Length from shoulder point to rump	-	-	4 11
Ditto from ditto	to horns	-	1 10

The beef was finely marbled or veined with fat, exceedingly tender, and of excellent flavour.

Mr Taylor fattened one of the cows, which was eight years old when killed.

			<i>sts. lbs.</i>
The two fore quarters weighed	-	-	26 4
The two hind ditto	-	-	32 11
Weight of carcase	-	-	59 1
Tallow	-	-	13 0
Hide	-	-	5 1
Total			77 2

Mr Shafto, of Whitworth, has also procured five cows and a bull of this breed, from the north of Devonshire : the bull is of a straight good form, and a better handler than most I have seen of this breed. This gentleman

has a small kyloe cow, bought of Mr Bates of Halton, which for real good handling, is scarcely to be surpassed.

About three years since G. Baker, Esq. got some Devon cows from near Bath, and a French bull, which I have heard was an excellent one of his kind; but it appears they have not answered his expectation, as he is now breeding from the improved short horns.

Herefordshires.

J. Hopper, Esq. of Witton Castle, procured 12 cows and two bulls of this breed, but finding them bad milkers, he sold them to Wm Salvin, Esq. of Croxdale; but there has not been time for properly ascertaining their comparative merits with the short horns.

SECT. II.—FOOD.

IN summer, cattle of every description are turned to depasture at large, either upon natural grass, or clovers and ray grass: instances of soiling are so very rare, that it cannot be called a practice of the county. In the autumn of 1807, when I was at Stanhope, Mr Walton had twelve young cattle in the fold yard, keeping on clover, which he said would keep them double the time,

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consumed in that way, that it would do, if they were depastured upon it where it grew.

In winter the fatting cattle are fed with turnips or cabbages, five or six times a day, given them in such quantities as they can consume : those that are loose in stalls, have straw in cribs, to go to when they chuse it ; if tied up, they have straw given them twice a day.

Milk cows have hay, and a few cabbages or turnips, (if any are grown upon the farm) and sometimes potatoes : the cabbages and turnips give the milk and butter an unpleasant taste, which may be cured in the latter, by putting one ounce of saltpetre to eight quarts of cream. Those who keep cows for the sale of milk, give them brewer's grains (provincially draff) which increases their milk equally with turnips, and without any disagreeable taste.

The young cattle in the arable districts are wintered on straw, and a few turnips, where they are produced : the best farmers never turn them out of their fold yards to graze, by which means a much greater portion of manure is made, and the grass lands preserved from being poached.

On the moor sides, the young cattle are turned out to depasture on heath all the day, which saves much fodder, and enables them to rear more than they could possibly do, without the advantage of the heathy commons.

Stalls for Feeding.

The usual mode of feeding cattle, is tying them up in

sheds ; but the gentlemen who are in possession of the improved breed of Tees Water cattle, from their long practice, and great attention to this subject, may be supposed to have tried various modes, and to have adopted such as they found most useful : their favourite cattle they do not tie up, but have their feeding places as represented in fig. 5, plate 5.

ABCD is a covered shed, 33 feet by 15 feet ; ADEF an open yard, 33 feet by 15 feet, in which is placed at the corner F, a trough for turnips.

The advantages of this mode are, that the cattle being at liberty to walk about, and being inured to the open air, when turned to early grass, they do not suffer from exposure to cold, nor from being cramped in the feet, which those that are tied up, are liable to.

Ascertaining, by weighing alive, the meat gained by food given ; live and dead weight, &c.

Mr Mason, of Chilton, is the only person I have heard of in this district, that has made an experiment of this kind ; but not being possessed of a weighing machine, the weights were estimated by the best judges, (chosen for the purpose) in the neighbourhood.

On the 8th of December, 1808, he put three oxen 2½ years old, (estimated to weigh 50 stones each,) to white globe turnips, with which they were fed at the rate of 17 sts. 4 lbs. per day on an average, to the beginning of February ; from this time they had ruta бага, 18 stones per day, on an average, to the beginning of May, when they were sold, and admitted by the butcher

to weigh at least 70 stones a piece, having gained 20 stones in 20 weeks; which is at the same rate as the weight gained by Mr Arrowsmith's heifer, mentioned page 235.

The Durham Agricultural Society, with a view of encouraging the improvement of live stock, offered premiums for that purpose; and amongst others, 20 guineas for the best ox under four years old, to be killed in December: the criterion of superiority to be the greatest proportion of weight of carcase, to that of live weight: 10 stones of live weight being fixed upon as the standard of comparison.

In 1805, Mr Luke Seymour's ox, 3½ years old, gained the premium.

His live weight was	-	-	-	sts.	lbs.
				125	5
				sts.	lbs.
Blood	-	-	-	2	10
Head and tongue	-	-	-	3	4
Heart, liver, and lungs	-	-	-	3	9
Feet	-	-	-	2	0
Bag and small guts	-	-	-	13	9
Non-essential offals	-	-	-	25	4
Hide	-	-	-	7	11
Tallow	-	-	-	7	13
Total offals	-	-	-	41	0
Carcase, or four quarters	-	-	-	84	5

The proportion of carcase to 10 stones of live weight, is 6 sts. 10 lbs. or as 1 to 0.673.

In 1806, Mr Nesham's ox, $3\frac{1}{2}$ years old, gained the premium: his weights were—

				sts.	lbs.
Live weight	-	-	-	137	$12\frac{1}{2}$
			sts. lbs.		
Blood	-	-	-	3	13
Head and tongue	-	-	-	3	6
Heart, liver, and lungs	-	-	-	4	1
Feet	-	-	-	2	1
Bag and small guts	-	-	-	8	11
Non-essential offals	-	-	-	22	4
Hide	-	-	-	8	0
Tallow	-	-	-	11	7
Total offals	-	-	-	41	11
Carcase, or four quarters	-	-	-	96	$1\frac{1}{2}$

The proportion of carcase to 10 stones of live weight, is 6 sts. $13\frac{1}{2}$ lbs. or as 1 to 0.696.

If experiments of this kind were extended to cattle of different ages and degrees of fatness, some general rules might be obtained for nearly ascertaining the weight of carcase, from knowing the live weight, and the degree of fatness of the animal. In the above instances of oxen

ox-draughts for several years; had them yoked in collars one before another, three to a plough, and driven by the ploughman, his Lordship not allowing a driver. Each ploughman had six oxen, three working four hours in the forenoon, and the other three, four hours in the afternoon. I lived in the neighbourhood at the time, and recollect that they were the standing jest of the adjoining farmers, for the small quantity of work they performed, and the expence it was done at.

At present I have not heard of a single ox-draught in the county; and it is no wonder that it should be so. When a farmer that has four three years old oxen, wishing to know whether working or feeding them will be most advantageous, makes a calculation similar to that in the Northumberland Report, he will not long hesitate to chuse feeding; and particularly in a district possessing a breed of cattle that can be sold fat to the butcher at so early an age as from two to three years old, and having horses of such peculiar activity and exertion, and capable of bearing such extra fatigue, as to perform, in hurrying and critical seasons, double the ordinary work; which is perfectly incompatible with the disposition and nature of oxen: for if they be driven a little beyond their natural pace, they are soon exhausted, and give up; and are incapable of any further exertions for some time afterwards, let the necessity be ever so great.

SECT. III.—SHEEP.

Tees Water and Leicestershire.

THE lower parts of this county were formerly famed for having the largest breed of sheep in the kingdom; many of them being from 50 to 60 lbs. a quarter; one in particular, a four shear sheep, bred by Mr Thomas Hutchinson, of Sockburn, killed and exhibited at Darlington, the 22nd December, 1777, was 62 lbs. a quarter.* I saw the carcase of this sheep, and regret very much not having seen him when alive; but I saw one soon after, belonging to Mr Dinsdale, of Newsham, that weighed 54 lbs. a quarter, which was nearly the height of a Shetland poney.

Soon after this, these great weighted sheep began to lose ground very fast, as the Dishley sheep were then making a rapid progress; Messrs Culley having been in the habit of letting tups for several years before, by which means most of the principal breeders had gotten crosses with the Dishley sheep, and of course the size and weight of the original stock were very much diminished.

Some time after this, Mr Robert Colling began to visit Leicestershire, and for several years afterwards hired some of their best tups; he also purchased ewes of the most improved breeds, by which he has long been in possession of a very superior sheep stock, which have

* A lamb of this breed, five months and four days old, bred by Mr Henry Hutchinson, was killed at Stockton Races, 1794, which weighed 22 lbs. a quarter.

been disseminated, by the great number of tups he has let yearly.

Mr Chas. Colling, following the footsteps of his brother, pursued the same course, and with similar success.

About fifteen years since, Mr Mason, of Chilton, began to turn his thoughts to improving his sheep stock, and knowing from the rules of breeding for the turf, that it required as much merit in the dam as the sire, he went into Leicestershire, and purchased 20 ewes of Mr Green, and other 20 of Mr Burgess, who had both long been customers of Mr Bakewell, and Members of the Leicestershire Tup Society; he also hired a first-rate tup, and continued to do so for some time afterwards, by which mode he has for several years been in possession of a breed of sheep, that ranks with the best in the northern counties.

These gentlemen stand first in the list of tup letters: Mr Trotter, Mr Seymour, Mr Nesham, and Mr Baker, are also eminent in that line. A great number are let yearly, at prices varying from 10*l.* to 100*l.*; and ewes taken in to a favourite sheep, at 10 guineas each.

The wool of this breed has been an object of attention of late years, and the fleeces have been increased in weight.

	<i>lbs.</i>	<i>lbs.</i>	
The hogs average from	7	to 9	per fleece.
Wethers from	6	to 8	
Ewes from	5	to 6	

The weight of the carcase, of shearlings 15 or 16 months old,

	<i>lbs.</i>	<i>lbs.</i>	
From - -	18	to 20	per quarter.
Two years old, from	22	to 30	

Ewes that have suckled lambs to the 1st of July, and are afterwards fatted, and killed at Christmas, weigh from 20 lbs. to 25 lbs. per quarter.

The Durham Agricultural Society gives a premium of ten guineas for the best fat wethers, *under two years old*, to be shewn and killed in December. The criterion of merit is the greatest proportion of weight of carcase to ten of live weight, the following are a few to which premiums have been adjudged :

<i>Premiums gained.</i>	<i>Live weight.</i>	<i>Weight of carcass.</i>	<i>Proportion of carcass to 10 of liveweight</i>
	<i>lbs.</i>	<i>lbs.</i>	
<i>For the best two.</i>			
1803.			
Mr Clark, of Bradley			
No. 1	176	125	7.10
No. 2	195	133	6.82
1805.			
Mr Deighton, of Winston			
No. 1	197	131½	6.68
No. 2	166½	113	6.786
<i>For the best five.</i>			
1806.			
Mr Wade, of Headlam			
No. 1	184½	128½	
No. 2	154	106	
No. 3	161	110½	
No. 4	166½	114	
No. 5	171½	117½	
Total weight of the five	837½	576	
Average weight	167½	115½	6.88
Average weight per quarter		28.8	
1807.			
Mr Arrowsmith, of Ferryhill			
No. 1	167½	115½	
No. 2	185½	125	
No. 3	174½	113½	
No. 4	184	129½	
No. 5	155½	98	
Total weight of the five	867½	580½	
Average weight of ditto	173½	116	6.7
Weight per quarter		29	

Sir Henry Vane Tempest offered premiums similar to the Agricultural Society, for stock to be shewn at his annual Agricultural Meeting or Sheep Shearing, at Wynyard, in June. As this is about six months earlier than the above time of shewing, I shall give the particulars of a few premiums.

<i>Premiums gained.</i>	<i>Live weight.</i>	<i>Weight of carcase.</i>	<i>Proportion of carcase to 10 of live weight</i>
<i>One shear sheep.</i>	<i>lbs.</i>	<i>lbs.</i>	
1806.			
Thomas Arrowsmith	153	106	6.928
Weight per quarter		26	
1808.			
Thomas Arrowsmith	130	88½	6.653
Weight per quarter		22½	
<i>Two shear sheep.</i>			
1806.			
Mr James Clark	212	155	7.311
Weight per quarter		38½	

From the above experiments, it appears that the average weight of carcase of the shearlings, was upwards of $\frac{2}{3}$ of the live weight, and nearly $\frac{1}{4}$ (or $\frac{7\frac{1}{2}}{100}$) of the live weight in the two shear sheep.

Mr Mason has favoured me with the following experiments, to ascertain the weight gained by sheep at different ages, from lambs five months old, to two years and seven months old.

No.	Lambs. Weight, August 15, 1803.	Shearlings. Weight, 4th October, 1804.	Gained to 4th October, 1804.	Two-Shear. Gained to 15th October, 1805.
	lbs.	lbs.	lbs.	lbs.
1	92	202	110	34
2	82	193	111	38
3	87	216	129	32
4	91	199	108	28
	352	810	458	132
Average	88	202½	114½	33

The weight gained from five months old, to one year and seven months, is on an average of the four sheep 114½ lbs. each sheep, from the 15th August to 4th October, or in 59 weeks; which is at the rate of 1 lb. 15 oz. per week: and from one year and seven months old, to two years and seven and a half months old, the gain in weight is on an average of the four sheep, 33 lbs. each sheep in 53 weeks, or per week 10 ounces.

By the experiments I made with tup hogs on ruta бага and khol rabie*, (page 152) the weight gained in 73 days,

* From the above it appears that the *shearlings* gained about three times the weight in the same time that the *two shear-sheep* did: hence the great advantage of having stock that fatten at an early age, not only to the farmer, but to the community at large.

was on an average 2 lbs per day, very nearly agreeing with the above result of Mr Mason's sheep of the same age.

Food.

In winter the store flock are depastured on grass; and when the ground is covered with snow, they get hay: when they begin to lamb, or a little before, a few turnips are given them.

The hogs and fatting sheep have turnips all the winter, the common kind being first eaten, and the ruta бага the last: in favourable springs, they are turned up on the clovers and ray grass about the middle of April, where they continue through the summer.

The numbers kept on different spaces of land, depends on its quality and fertility: the best old pastures will summer from six to eight sheep an acre, and good clover eight; and there are many old pastures in the county that will scarcely summer a sheep an acre; and much land where the first year's clover wont depasture more than three sheep an acre.

Heath Sheep.

These are known by their black or mottled faces, black legs and coarse wool, and have long been inhabitants of this county: they are mostly bred in Teesdale, Weardale, and towards the head of the Derwent, by the small farmers that adjoin the barren heathy districts that intervene between those vales.

In summer they range over those barren heathy mountains without any attending shepherd: when the owner wants to collect his sheep, he knows them by having

the initials of his name, or some other particular mark, upon them: towards winter, when snows are expected, they are brought nearer the inclosed grounds; and have hay given them in deep snows, when they cannot scratch down to the heath. The ewes begin to drop their lambs about the middle of April, and are then taken into the inclosed grounds for a short time.

In November the whole flock is salved, at the expence of about sixpence each. The young ewes are not put to the tup before they are two shears. The average prices which these sheep have been sold for, of late years, are—

	£.	s.	d.
Lambs in July - - -	0	8	0
Hogs in May - - -	0	15	0
Ewes 4 years old in October -	0	12	0
Wethers, 3½ years old - - -	1	4	0

The ewes weigh about 11 lbs. per quarter, and the wethers 16 lbs.

The wool is long and coarse, particularly the buttocks. The average weight of hog, ewe, and wether fleeces about 4 lbs, and has been sold from 7½d. to 8d. per lb. of late years.

The ewes are sold for breeding fat lambs, mostly into the eastern parts of the county (where the occupiers cannot keep a breeding flock, on account of the rot:) they are put to a long woolled tup. The proceeds are—

		£.	s.	d.
Lamb, sold beginning of July	-	0	16	0
Ewe, di to October	-	0	18	0
Fleece	- - - -	0	2	0
Total sold for		2	16	0
Deduct the price paid for ewe		0	12	0
Leaves for a year's keeping		1	4	0

The wethers are sold to be fattened on turnips; a few to gentlemen, to be kept on grass and killed at five years old, for the use of their own tables, on account of the superior quality of the mutton.

Distempers.

The Rot is a malady very extensively felt over a large portion of this county: even lands that appear sufficiently dry, and of similar quality to those of other districts, that are perfectly sound, in this county are very unsafe; and in wet autumns are certain to rot the flocks that depasture upon them.

Towards the latter end of autumn, the lambs or hogs are subject to a disorder of which they die very suddenly, called here the "*Black-water*," supposed to arise from their growing worse in condition, or their food not being sufficiently nutritive, as it is found that if they be put upon turnips, very few, if any, die of this complaint.

SECT. IV.—HORSES.

THE south-east part of the county, and the opposite parts of Yorkshire, have been long famed for a valuable breed of horses for the draught, known under the appellation of Cleveland Bays, which are the original stock of what was formerly the English coach horse, and also of strong hunters and road horses.

They are not loaded with legs and two great ends, but have well formed carcasses, and strong sinewy light legs, which latter property they probably obtained from a small degree of kindred to the race horse.

They are not only strong, but also remarkably active, good travellers, and bear a long continuance of exertion and fatigue, frequently going 60 or 70 miles to and from coals or lime, in 24 hours, and very often without ever being taken out of the carriage, and this three times, and very often four times a week: when they go only three times, they work three half-days at home besides.

The weight drawn by these horses I obtained at the collieries, by the number of corves carried by each description of carriage: a corf of coals being 4 Winchester bushels, and its weight 26 stones, or $3\frac{1}{4}$ cwt.

	<i>Corves.</i>	<i>Bush.</i>	<i>Cwts.</i>
A single horse cart carries	6*	24	$19\frac{1}{2}$
Two horse ditto	9	36	$29\frac{1}{4}$
Three horse ditto	12	48	39
Four horse waggon	18 or 19	74	60

* Some of the strongest horses, such as are used in waggons, carry 7 corves, or nearly 23 cwt.

The roads upon which these weights are drawn, are not upon a level, but have several banks on them; Bildershaw in particular (a little to the south of West Auckland) is not only steep, but upwards of a quarter of a mile in length.

In other parts of the county there is also a mixed breed, obtained by crosses with the Cleveland Bays, and by blacks and blood horses; but for the general purposes of farming, none of them are equal to the old original stock of Cleveland Bays; and those persons who are in possession of the pure breed, when they are selling them, by way of recommendation, never fail to assert, that they have neither black nor blood in them.

"*The number kept to a given space of land,*" depends much on situation, as distance from coals, lime, markets, quality of the soil, &c.; but in general the mode of estimating in stocking farms, is two horses to every 40 or 45 acres of ploughing.

Food.

In summer, most of the principal farmers keep their horses on cut clover and tares: those who do not follow this beneficial practice, turn them out to grass about the middle of May.

In winter, the most prevalent mode is to give them straw from November to April, and from that time until they are turned to grass they get hay.

In respect to corn, the general practice is to give each horse from 2 bushels to 2½ bushels a week, from martinmas to midsummer, and from thence they get no corn.

In a few instances where they get straw through the

whole of the winter, the allowance of oats is $2\frac{1}{2}$ to 3 bushels per week, and half of that quantity when at clover through the summer.

Expences.

	£.	s.	d.
Summering - - -	5	0	0
Wintering on straw and hay -	3	10	0
Corn, 70 bushels, at 3s. -	10	10	0
Shoeing - - -	0	15	0
Harness - - -	1	0	0
Decline in value - -	3	5	0*
Total expence per year of one horse	24	0	0

SECT. V.—HOGS.

THE breed of swine in this county was formerly a large white kind, with broad ears hanging over their eyes, and two teat-like excrescences from each jaw,

* Many farmers in this district work their horses from 3 to 7 or 8 years old, and then sell them; by which mode they do not consider any loss by decline in value.

(provincially wattles :) the remains of these are now rarely to be met with : the first attempt at change was by introducing the black breed, and afterwards several other varieties.

The most prevailing kinds at present are from the Berkshire black and white, which were first introduced by George Baker, Esq. of Elemore, who, with other intelligent breeders, thinking them too large in the bone, he afterwards introduced a small white sort, bred in the counties of Leicester and Norfolk, which have a great propensity to fatten, and have very little offal.

The Berkshire, at a year old, weigh on an average about 18 stones.

The white breed at the same age, about 12 stones.

The Agricultural Society give premiums of five guineas for the best pig under 18 months old, to be killed in December. Mr Reed, of Durham, has gained this premium for the last four years, with a variety of the Berkshire breed : their weights are given in the following table, and also of those that were adjudged to be second.

	<i>Live weight.</i>		<i>Dead weight.</i>		<i>Proportion of carcase to 10 stones live weight.</i>
	<i>sts.</i>	<i>lbs.</i>	<i>sts.</i>	<i>lbs.</i>	<i>sts.</i> <i>lbs.</i>
1805.					
1st. Mr Reed	36	2½	32	6½	8 13½
2d. Mr Nesham	23	1¼	20	0	8 8½
1806.					
1st. Mr Reed	41	12	38	2½	9 1½
2d. Mr Westerhall	35	5	31	11½	8 13½
1807.					
1st. Mr Reed	29	13½	26	2½	8 10½
1808.					
1st. Mr Reed	44	4¼	40	2¼	9 0½
2d. Mr Wm Arrowsmith	31	3	27	5½	8 11½

CHAP. XV.

RURAL ECONOMY.

SECT. I.—LABOUR.

SERVANTS hired by the year, employed in agriculture, are in general young men, who have bed and board in the house of the farmer : their wages for some years back have been—

			L.
For a good man servant	"	-	21
Ditto a woman	"	-	8

When servants of this class get married, they then become day labourers (very few of this description being hired by the year) and live in cottages by themselves and families, as in Northumberland.

Day labourers are of course very numerous.

In winter, men have from 2s. to 2s. 3d per day ; and women 8d. ditto. In summer, men have from 2s. 6d. to 3s. per day ; and women from 10d. to 1s.

Labourers for harvest are mostly hired every morning, by a kind of auction in every village, one farmer bidding against another, and very often (either from necessity or pique,) to very extravagant lengths; of course wages for harvest are very fluctuating: women will get one day 4s., and the next only 2s.; but on an average the wages through the harvest will be, for men 2s. 6d. and women 2s.: the hours they work are from 8 to 12, and from 1 to 5, in all 8 hours. The year's earning of a day labourer, is from 36*l.* to 40*l.* a year.

The earning of his wife depends much on circumstances: if she has a small family, her earnings are small, but as the children get up they are set to work, and in some cases, the more children a man has, he becomes the richer: I know a labourer of this class, who some years since was very much distressed with a young family of six children, who are now become his wealth: their earnings are as follows:

	s.	d.	
The father	15	0	per week.
1st son, 12 years old	9	0	
2d ditto, 11 ditto	8	0	
3d ditto, 7 ditto	6	0	
4th ditto, 6 ditto	3	0	
Making in all,	£2	1	0 per week,
which is 106 <i>l.</i> 12 <i>s.</i> a year.			

The rise of labour is about double within the last 20 years.

The hours of work are as follow:—

Men labourers from 7 to 5, and rest 1 hour at dinner.
 Women ditto ditto 8 to 5, ditto
 Ploughmen go from 7 to 12, and from 1 to 5, and
 work at odd jobs before and after ploughing, when the
 length of days will permit it.

Piece Work.

Mowing from 3s. to 4s. per acre.

Paring ditto, 15s. to 20s. ditto.

Burning ditto, 7s. to 8s. ditto.

Cutting drains 3 feet deep, 18 inches wide at the top,
 and 9 inches at the bottom, 1s. per rood of 7 yards.

Cutting drains, laying stones, and filling in, from
 1s. 3d. to 1s. 6d. per rood.

Fencing : earth dykes ; the ditch 4 feet wide, 3
 feet deep, and mound $3\frac{1}{2}$ feet high, from 2s. 6d. to
 3s. per rood, according to the softness or hardness of
 the soil.

Dry-walling 3s. 6d. per rood ; the height 5 feet 6 ins.

Removing earth by the cubic yard, from 3d. to 6d.,
 according to circumstances.

Threshing. For wheat, 9d. per bushel,

For barley, $4\frac{1}{2}$ d. ditto.

For oats, 3d. ditto.

Drawing straw for thatching, 4d. per threave

SECT. II.—PRICE OF PROVISIONS.

OF late years the price of corn has been very high: the average of Durham markets for the last seven years are—

		s.	d.
Wheat	-	10	0 per bushel
Maslin *	-	8	0 ditto
Barley	-	6	0 ditto
Oats	-	3	6 ditto
Beef	-	0	7 per lb.
Mutton	-	0	7 ditto
Geese	-	4	0 each
Turkies	-	5	0 ditto
Fowls	-	1	0 ditto
Eggs	-	0	6 per dozen
Butter	-	1	6 per lb.
Cheese	-	0	6½ ditto
Potatoes	-	2	0 per bushel
Milk	-	0	2 per quart

SECT. III.—FUEL.

THE fuel of this county is coal, except a small por-

tion towards the head of the rivers Tees, Wear, and Derwent, where a few peats are used.

In many parts of the county, the price of a cart load of coals containing 36 Winchester bushels, at the pits, is from 2s. 6d. to 3s. per cart; but in the southern parts, where there is a great demand from Yorkshire, the same quantity is sold from 5s. to 6s. 6d.: a labourer's family consumes from 4 to 6 cart loads a year.

CHAP. XVI.

POLITICAL ECONOMY.

Circumstances dependent on legislative authority.

 SECT. I.—ROADS.

* *Turnpike Roads* were first made in this county in the year 1742, and between that year and 1751, the first acts of parliament for making the most principal turnpike roads were obtained. From thence a period of 40 years elapsed before any other act was applied for, except those from Staindrop to Winston, and from Gateshead to Dilston Bar, as appears by the following table, in which are enumerated all the turnpike roads in the county; the date when the first act of parliament for each was obtained; the length in miles; the yearly amount of tolls, and debt upon each road: this last particular, some of the clerks refused to make known, though it can scarcely be called a secret, which is so repeatedly exhibited at public meetings, and so many have a right to know, and to make known.

Some of these roads, and particularly those that are

kept in good repair, have paid off nearly the whole of the money originally borrowed. Mr Fairless made no secret of informing me, that the debt upon the road from Sunderland Bridge to Barnardcastle and Bowes, was only 600*l.*; that there was no arrear of interest, and that it is only aided by one-sixth of the statute duty: the distance is 26 miles; the funds for repairing, 14*l.* per mile.

Turnpike Roads in the County of Durham.

No.	Names of Roads.	First act obtained.	Length.	Amount of tolls.	Dcts.	Fund for repairs per mile.
		Year.	Miles.	£	£	£
1	Durham to Yarm and Catterick Bridge	1742	41	976		
2	Durham to Darlington and Borough Bridge	1745	52	3986	7000	68
3	Durham to Tyne Bridge	1746	14	1596	2740	100
4	Durham to Sunderland	1747	13	508	2300	26
5	Stockton to Barnardcastle	1747	27	1423	7605	37
6	Sunderland Bridge to Barnardcastle and Bowes	1748	26	450	600	14
7	Pierce Bridge to Tuddo Lane End*	1748	16	114	2605	0
8	Darlington to Railey Fell, and Pierce Bridge } to Royal Oak	1751	21	1440	1200	62
9	Staindrop to Winston and Gatherley Moor	1761	16	391	3210	12
10	Gateshead to Dilston Bar	1777	22	676		

* This road has paid no interest for 13 years, and when the present act expires, it is probable no renewal will take place.

Turnpike Roads in the County of Durham.

No.	Names of Roads.	First act obtained.	Length.	Amount of tolls.	Debt.	Fund for repairs per mile.
		Year.	Miles.	£	£	£
11	Norton to Sunderland	1789	26	660	7000	10
12	Railey Fell to Allansford and Otterburn	1792	55	507		
13	West Pits to Middleton	1792	12	388		
14	Gateshead to Wolsingham and Burtreeford	1793	35	1393	9600	14
15	Wolsingham to Durham		16			
16	Bryan's Leap to Black Hedley		10			
17	Cockerton to Staindrop	1795	12	325	2780	12
18	Sunderland to Newcastle and Shields	1796	17	1065	8329	95
19	Durham to Shotley Bridge	1810	14			

Some of these roads, for several years after being first made, took nearly the whole of the money arising from the tolls, for keeping them in repair, and the interest was added to the principal: some of them do not yet pay full 5 per cent. interest; for those that are in this predicament, the fund for repairing per mile will be more than in the above table, which was obtained by subtracting the amount of interest, salaries, &c. from the amount of the tolls, and dividing the remainder by the length of road.

The materials for repairing these roads, are whinstone, limestone, river gravel, and freestone; the first is by much the hardest and most durable: those roads upon which it is used, and broken *sufficiently small*, are in much better repair than those where it is not applied. The superiority of this species of material for making roads is such, that it is frequently led 10 or 12 miles, in preference to using freestone, that can be had at a few yards distance. The limestones of the western parts of the county are also excellent materials for roads; but those in the eastern district are many of them much softer and very inferior.

The mile stones upon the road from Sunderland to Durham are upon a new construction, suggested by the clerk, Mr Tho. Sanderson, to prevent the wanton and shameful practice of defacing them: they are hollow triangular prisms of cast iron, with the letters and figures projecting from the face of the prism; they are $2\frac{1}{2}$ feet high, fixed upon an oak post $4\frac{1}{2}$ feet long, which is sunk 2 feet in the earth.

Guide posts, so useful and necessary to strangers, are much wanting upon almost every road in the county.

Some of these roads are kept in very good repair, particularly that from Sunderland Bridge to Barnard-castle, as are those from Sunderland to Durham; the coal road from Railey Fell to Darlington and Pierce Bridge is also in good repair, as well as the road from Cockerton to Staindrop; but the road from Stockton to Durham is very ill kept, and I am sorry to add, that the great post road from Darlington to Newcastle is in a similar predicament.

The materials for repairing these roads are in some parts certainly not the best; but I would recommend a trial of applying them in a different manner than has been usually practised, by laying them wider, instead of laying them repeatedly upon the middle of the road, and by that means raising it too high, so that carriages are forced to keep all the same track, and by that means gutter and rut it so much, as to make it at least very unpleasant, if not *very unsafe* to travel upon. Wherever roads are made narrow and high, carriages are obliged to keep all in one path; but where roads are made broad and nearly flat, or with a small convexity, carriages run from side to side, scarcely two in a day going in the same track, by which means the road is equally worn, and a rut is rarely seen upon it.

The road from Durham to Newcastle has a number of large stones in it, which a friend remarks, "act as anvils for waggons and other heavy carriages, to crush and grind to powder other stones that are laid upon them." It is wonderful that these have never been hacked up and broken smaller.

At the first making of these roads, the trustees had not thought of making any alterations from the track of

the old road, either for obtaining a nearer line, or for easing or avoiding steep banks, (probably their funds would not admit of purchasing lands for a new line of road), several of these might be made much easier, and at no great expence: for instance, on the great post road the bank on the north side of Ferry Hill might be made much easier by taking the road on the south side of the cottage, near the public well, and a little into the adjoining field. That at Sunderland Bridge, by raising the road at the end of the bridge, and taking it behind the blacksmith's shop, so as to come on to the present road a little to the east of the turnpike gate. The banks at Chester Dene might be made much easier, at a trifling expence, by making a new road to form the two sides of a triangle, of which the present one is the base; and instead of climbing the Long Bank, and going to the top of Gateshead Fell, to have to come down other two steep banks, a new line of road should be made by Low Eighton and Chowden, to join the present road at the top of Gateshead, near Mr Falla's nursery: this line would have only one easy bank, is nearer than the present one, and the greatest part of it already a public road, and of course there would be only a small portion of land to purchase; but if the expence of purchasing land be considered of little import, an easier line may be had by going at the foot of Long Acre Wood. In so wealthy a district it is somewhat surprizing that so great an improvement should have remained so long in being carried into effect.

A friend observes, that "the *justice* of the contribution
 " levied on the great post road, *for paving and lighting*
 " *the city of Durham*, when the way by White Smocks is
 DURHAM.]

“ more level, and nearer by half a mile, is a term which
“ has been prudently omitted in the preamble to the act.

“ The prevailing fashion of making plantations near
“ to public roads, is a great nuisance: they prevent the
“ roads from drying, and promote the accumulation of
“ snow.”

Township Roads.

The township roads are much neglected, like those in every other county repaired by statute labour, of which every one endeavours to do *as little as he possibly can*. This law should be altered, and instead of statute duty, a tax of so much per pound rent laid on in lieu of it: the duty of the person or persons appointed to expend this tax upon the roads, would be strictly scrutinized, as every one contributing to the tax, would have an interest in seeing that it was properly and prudently expended.

If a tax of from sixpence to one shilling a pound was laid on according as it was found wanting or necessary, every good farmer would cheerfully pay it, rather than have his draughts and men taken off to perform statute duty, and would consider himself a gainer by the measure.

SECT. II.—IRON RAIL WAYS.

THERE are no iron rail ways used as public roads in this county.

SECT. III.—CANALS.

THERE are no canals in this county: several have been projected, but none carried into effect.

The first attempt to make a canal was by the late Mr George Dixon, upwards of fifty years since, to carry coals from Cockfield Fell Colliery, (which he rented of the Earl of Darlington,) by a small canal, *without a lock*, to the top of Raby Bank, near Keverstone, and then to convey them in waggons down an inclined plane, to the foot of the bank, the loaded waggons to draw up the empty ones: from the foot of the bank the coals were to be conveyed in another canal, without a lock, to near the top of Grant Bank, where they were to be taken up by the carts from Yorkshire, that came over Pierse Bridge and Winston, &c. He cut a short piece of canal upon Cockfield Fell, and had a flat-bot-tomed boat upon it, to prove to the late Earl of Darlington the practicability of the scheme; but his Lordship refusing to advance any money, the scheme was abandoned.

The next attempt was projected by some spirited merchants and traders of Stockton and Darlington, to make a canal from Stockton to Staindrop, with branches to the bridges of Yarm, Croft, Pierse Bridge, and Winston: a sum of 861*l.* was subscribed for defraying the expence of surveys, &c.

Messrs Brindley and Whitworth were employed in 1768 to take the levels, and make an estimate of the expence: their report stated the length and levels as follows:

Main Canal.

From Stockton to near Fighting Cocks, in Yarm Lane
 From near Fighting Cocks to Darlington
 From Darlington to Killerby
 From Killerby to Winston

Total of main canal

Branches.

From Cotham Stob to Yarm
 From Darlington to Croft Bridge
 Thornton to Pierce Bridge

Total length of main canal and branches

<i>Miles. Fur. Chains.</i>	<i>Fet.</i>
8 1 9 $\frac{1}{4}$	141 feet rise
5 6 7	level
8 0 1	187 rise
4 7 1 $\frac{1}{2}$	level
26 7 9 $\frac{1}{4}$	328 rise
1 6 8 $\frac{1}{4}$	level
3 0 8 $\frac{1}{4}$	level
1 5 9 $\frac{1}{2}$	level
33 4 9 $\frac{1}{2}$	

The dimensions of this canal were—breadth at top, 28 feet; at bottom, 16 feet; and depth of water, 4½ feet, which would have carried vessels of 25 tons burthen. The estimated expence 64,000*l.* It was to have 41 locks, estimated to cost 500*l.* per lock, and 61 bridges, at 60*l.* per bridge.

The branch to Croft Bridge was to be 20 feet below the level of that part of the canal from which it was taken.

At a meeting held at Darlington, to take into consideration Messrs Brindley and Whitworth's report, it was suggested by the late Mr George Dixon, of Cockfield, that it would be of great benefit to have a branch through the coal district, to come from Railey Fell Colliery, through the collieries of Greenfield, West Auckland, Ramshaw, Norwood, Butter Knowl, and Cockfield Fell, *without a lock*, to the top of the bank above Morton, from whence the coals were to be conveyed to the main canal down an inclined plane (the loaded waggons to bring up the light ones :) this proposal was so favourably received, that orders were given for taking the levels and survey, in which I assisted; estimates of the expence were made and printed; a plan of the line where the canal would go, engraven, and ready to be delivered to the subscribers: but for reasons best known to the person with whom they were deposited, they were not distributed, nor any further steps taken in the business; nor was I able, though I made many enquiries, (on the present occasion) to find any person who had a plan of this proposed canal, or the printed estimate that accompanied it.

The dimensions of this canal were proposed to be 15

feet wide at the top, $7\frac{1}{2}$ at the bottom, and 3 feet deep, and to carry boats of 10 tons : the expence was estimated to be about 8000*l*.

In 1796, Mr Dodd surveyed and projected canals to join the Tyne and the Wear, by the vale of Lamesley to Picktree, with a branch by Beamish to Kyo West Houses, and from the city of Durham to the navigable part of the Wear, near Picktree.

A little below Stockton the navigation of the Tees is rendered very tedious, and often very difficult, by a peninsula so very extraordinary, that though the neck of land between the two parts of the river is only 200 yards, yet the course of the river is above $2\frac{1}{4}$ miles. It has often been proposed to make a cut through the narrowest part of the peninsula, but no effectual steps were taken before 1808, when an act of parliament was obtained for the purpose, and it is now executing under the direction of that able engineer, Mr William Chapman, whose report proposes to make the cut 60 feet wide : he estimates the expence of cutting at 3184*l*. to which is to be added the purchase of land for the new channel, and expences of obtaining an act of parliament.

This will be a great improvement to the navigation of the river, and to the trade of Stockton ; as ships can get up to the town in one tide, which took them at least two before, and very often they could not get up at all, and were of course obliged to unload at Portrack, about two miles below.

Before I close this article, it may not be improper to mention a contrivance of the late Mr George Dixon, of Cockfield, for conveying coals, (or other bodies of nearly the same specific gravity) by water, without boats : the specific gravity of coals being not much more than water, he calculated the declivity necessary to give water

a sufficient force, to overcome the excess of weight that an equal bulk of coals had over an equal bulk of water, and had a cut made upon Cockfield Fell, about 4 feet wide at the top, and 3 feet deep, with such inclination, as gave the water the necessary velocity: when a cart-load of coals was put into it, they swam or were carried gently by the water, into a reservoir or standing pool at the lower end, and deposited in proper vessels, to be drawn out as they were filled.

SECT. IV.—FAIRS.

Durham.

The 31st March, a great fair for horses and cattle: the fair for horses continues a week. A great many horse dealers from London and other parts of England and Scotland attend this fair.

The Saturday before the 12th of May for cattle, a few horses, and for hiring servants.

Whitsun-eve, for cattle, horses, and sheep.

The 15th September, for horses and cattle.

Darlington.

The first Monday in March, a great fair for cattle, horses, and sheep.

Easter Monday, for cattle, horses, and sheep.

Whitsun Monday, ditto, ditto, ditto.

Monday fortnight after Whitsunday, called Great Monday, for cattle, sheep, &c.

Barnardcastle

Has three fairs, Easter Monday, Whitsun Monday, and Maudlin-day (2nd August), at all of which a few cattle and horses are shewn.

Wolsingham.

The 18th May and the 21st September, for a few cattle, sheep, and swine.

Bishop Auckland.

The fairs here are very insignificant : a few pigs and lean sheep, and sometimes half a dozen young cattle, and two or three milch cows, are in general what are exhibited here. The fair days are, the Thursday next before ascension day, corpus-christi day*, and the Thursday next preceding the 10th of October, yearly.

South Shields.

The 24th June, and 1st September, for pedlar's wares and toys, but principally for drinking and dancing.

Sunderland.

The 13th May, and 11th October : similar to South Shields.

* Provincially "copy-cristy."

SECT. V.—MARKETS.

Monday.

Darlington for corn and provisions of all kinds.

There is a large market for cattle every other week, called *Fortnight Days*, which were formerly held from the first Monday in March, to the Monday in November; but of late years they have been continued through the year.

Tuesday.

Wolsingham, for butcher's meat, butter, potatoes, and corn: the quantity sold is not great, but the prices are generally as high as any in the county: the greatest part is for the consumption of the lead mine district.

South Shields, for provisions.

Wednesday.

Barnardcastle, for provisions of all kinds: corn is sold higher here, than in any market in the county, for the consumption of the mining districts to the westward; and considerable quantities are carried into Westmoreland.

Stockton, for corn and provisions, with which it is well supplied, and at reasonable rates: the market is much

improved since the erection of the bridge opened an easy passage into Yorkshire.

Thursday.

Bishop Auckland, for provisions: corn market very trifling.

Friday.

Sunderland, for corn and provisions: the corn markets have been much better supplied since the market-hour was altered (in 1806) from three in the afternoon, to begin at eleven, and end at one. The new turnpike to Stockton, and the easy access to the north, bring many farmers who formerly attended other markets.

Saturday.

Durham, a large market for corn, and every species of provisions.

Staindrop, a small market for provisions; very little or no corn sold.

The hiring days for servants are the market-days next before May-day, and Martinmas; at each of the respective markets.

SECT. VI.—WEIGHTS AND MEASURES.

LAND is measured by the statute acre of 4840 square yards.

The corn measure is that of Winchester; but in most markets it is larger by about 1-20th, and in some places, and by particular farmers, it is increased to 1-16th more than the Winchester bushel.

In Stockton market the corn is sold by the Winchester bushel, but with a condition that a bushel weighs a certain weight, and what it is under or over, the price to be diminished or increased in proportion: Thus, if wheat be at 10s. per bushel of 60 lbs. then two-pence is to be paid or received for every pound above or below that weight.

Oats are sold in a similar way: the bushel to weigh 33 lbs.

Barley is sold by measure, without any reference to weight.

Potatoes are sold at Sunderland and Shields by the firkin: at the former place, 3 bushels are a firkin; and at the latter, $2\frac{1}{2}$.

The denomination of measures varies in different markets.

At Durham.

- 4 Hoops=1 peck
- 2 Pecks=1 kenning
- 2 Kennings=1 bushel
- 2 Bushels=1 boll

Sunderland.

- 4 Beatments=1 peck
- 2 Pecks=1 kenning
- 2 Kennings=1 bushel
- 2 Bushels=1 boll

Darlington and Barnardcastle.

- 4 Quarterns=1 peck
- 4 Pecks=1 bushel
- 2 Bushels=1 boll

SECT. VII.—PRICE OF PRODUCT COMPARED WITH
EXPENCES.

THE advance in price of both provisions and labour has been very great of late years. The difference between

the years 1785 and 1805, a period of 20 years, is shewn in the following table :

Prices of Provisions.

	1785.	1805.
	s. d.	s. d.
Wheat and maslin per bushel	5 6	9 0
Barley ditto	3 6	6 0
Oats ditto	2 0	3 6
Potatoes ditto	1 6	2 0
Beef per lb.	0 5	0 7
Mutton ditto	0 5	0 7
Wool ditto	0 8	1 0
Butter ditto	0 9	1 4
Cheese ditto	0 5	0 7
Milk per quart	0 1	0 2
	15 3	24 9

Prices of Labour, &c.

	£. s. d.	£. s. d.
Man servant per year	10 0 0	21 0 0
Woman ditto ditto	4 0 0	9 0 0
Man labourer per day	0 1 2	0 2 6
Woman ditto ditto	0 0 6	0 0 10
Carpenter's ditto ditto	0 1 6	0 3 6
Mason's ditto ditto	0 1 6	0 3 6
Blacksmith's work per lb.	0 0 5	0 0 8
Oak wood per foot	0 1 6	0 3 3
Ash ditto	0 1 0	0 2 3
Fir ditto	0 1 0	0 2 6
	14 8 7	30 19 0

From the above it appears that the price of provisions taken in the aggregate, has advanced in the ratio of 1 to $1\frac{1}{2}$; and the price of labour and materials in the ratio of 1 to 2.

SECT. VIII.—MANUFACTURES.

THE species of manufactures in this county are pretty numerous: in the northern parts, the most material are of

Wrought Iron,

Which were first established in 1690, by Mr Ambrose Crawley, an individual of superior mind, though originally (it is said) in the humble station of a blacksmith: to him the extensive and various manufactures of iron at Swalwell and Winlaton owe their origin. This active genius first began his manufactures of iron at Winlaton; but soon after finding that Swalwell, from its vicinity to the Derwent and Tyne, having the advantage of water carriage, was a much more convenient situation, he removed the manufacture of all the heavy articles to that place, and left those of a lighter nature to be made at Winlaton, and Winlaton Mills.

At Swalwell they make anchors of all sizes, from the smallest to five ton weight; they also make boom chains,

mooring chains, and various other kinds of chains and iron work for his majesty's navy.

They also make hoes, bills, traps, chains, bolts, large hinges, and various other articles ; and have a foundry for casting pots, pans, smoothing irons, &c. &c.

Two forges, one for making plates for sock molds, shovels, &c. ; the other for lumping iron, and drawing it for the use of the workmen ; and a slitting mill.

At Winlaton Mills they manufacture files, edge tools, cane bills (for the West Indies) filed hinges, saws, &c. ; here is also a slitting mill, a mill for grinding edge tools, and a tilt forge, which makes 480 strokes a minute, all driven by water.

They also have here a forge for making German steel, another for common steel, and one for preparing workmen's iron.

At Winlaton are manufactured chains, hinges, rings for women's pattens, nails of all sizes, from seven pounds weight per thousand, to the largest spikes.

The men employed in these factories are governed by a code of bye laws, instituted by the worthy and benevolent founder. The laws are put in execution by a court of arbitrators, held at Winlaton every ten weeks, for hearing and determining causes among the workmen, by which their differences or claims to justice are settled in an easy and expeditious manner, and they are secured from the expence of law suits, the fees being fixed at a moderate rate. The compulsory power consists in expulsion, which includes a forfeiture of the claim on the fund, to which each has been contributing while in the society. One regulation particularly merits notice :

“ No publican can sue in this court for debts contracted for drink.”

He also made an excellent regulation for supporting their own poor, by each workman contributing eightpence a pound out of his earnings, which raises a fund that enables them to allow a man and his wife seven shillings a week when past work ; a widow is allowed three shillings a week, and one shilling a week for each child : to entitle them to this privilege, they must live all their time with the factory : if they leave it, they lose the benefit of this association.

He also established schools at Winlaton, Winlaton Mills, and Swalwell, for the sole benefit of the workmen's children.

The proprietors built a chapel at Winlaton, capable of holding upwards of 300 persons, and pay the officiating clergyman. They also keep and pay a surgeon for attending the workmen, whenever they require it.

Farther up the river, at Derwent Cote and Blackhall Mill (belonging to Mr Cookson) they make malleable iron from old cast metal, and fuse old iron in a furnace, to make into sock molds, shovels, boiler plates, bar iron, &c. ; they also make steel by cementation with charcoal, and work it over afterwards four or five times with hammers.

Messrs Hawks and Sons have manufactures similar to those at Swalwell, at New Greenwich and New Deptford iron works on Tyne side, and also at the forges of Bea-mish and Lumley.

At High and Low Team are also works of a similar nature, belonging to Messrs Morrison, Mossman, & Co.

There are also some iron works lately established at Bedburn, near Hamsterley.

At Shotley Bridge, there is a manufacture of swords of various kinds, which was established by some Germans, upwards of a hundred years since.

Founderies.

Of founderies for casting iron and brass, there are two at Gateshead, one at Stella, one near Chester-le-Street, one at Sunderland, and two higher up the river: there are also, on a small scale, one at Darlington, and another at West Auckland.

Glass Houses.

There are several glass houses on the Tyne, both at Gateshead and South Shields, and also on the Wear, in the vicinity of Sunderland, where great quantities of flint glass, crown glass, and bottles, are manufactured.

Potteries.

Upon Gateshead Fell there are four potteries, where earthen ware of all kinds is made, both for home consumption and exportation: there are also potteries at Hilton, Houghton-le-Spring, and at Coxhoe, for common coarse ware.

Salt.

Besides the salt made at Birtley already described, page 47, there are four salt works at South Shields, which have 17 pans, two of which are for making flux for glass. The making of salt at this place was much more extensive formerly, as there were 130 salt-pans about 60 years since.

Copperas.

For the manufacture of this article, there is one work on the Tyne, and two upon the Wear, viz:—one at Deptford, about two miles above Sunderland, and another about three miles higher up the river.

Sal-ammoniac.

There is one work of this kind on the Tyne, and another on the Wear.

Coal Tar.

About seven years since, some works were erected at Heworth Shore, upon Tyne, for making coal tar; but the first work of this kind that was ever established in the kingdom for extracting tar from coals, was at Cockfield, by the original inventor, the late very ingeni-

ous Mr George Dixon, in 1779*, who continued making it until 1783, when he dropped the business, on account of the heavy expence of land carriage to Sunderland, where the tar and pitch were principally used for ship-building.

This species of tar and pitch has been found much more durable for ship bottoms than that obtained from vegetable substances, and also to resist the ravages of the worm, so destructive to ship bottoms in the southern oceans.

The quantity made per week was about six barrels, besides a considerable portion of coal oil, for which there was at that time scarcely any demand.

He had discovered the process for extracting tar from coal upwards of 20 years before he began to manufacture it for sale, as I remember being much amused when a little boy, by his filling an old tea kettle half full of coals, and setting it in the fire, and luting a tobacco pipe with clay to the spout, and to this several others round the end and side of a room; after a certain time, he put the flame of a candle to the end of the farthest pipe, and immediately a bright flame issued from it, where nothing was perceptible before; he then made small holes with a pin, through the clay that luted the pipe heads and shanks together, and applying the flame of a candle to each, there were as many flames as pipe heads. He had only made the discovery a little before, and this was probably

* In 1781, Lord Dundonald got a patent for making coal tar; and from this circumstance has been generally thought the original inventor, though tar from Mr Dixon's manufactory had been in constant use for at least two years before, for ship building, &c.

the third or fourth exhibition of illuminating rooms by gas lights. This mode of lighting rooms was for a long time a favourite project with him, and he had thoughts of lighting his collieries with them, but was cured of it by the following experiment, at which I was present : Wanting to know the quantity of tar produced by a ton of coals, he erected a furnace, with a large cast metal boiler, in which the coals were put ; to this were fixed two large cast metal pumps ; one of them passed through water, in order to condense the oil and tar ; the end of this was filled by a wooden plug, with a small hole to let out the tar, &c. Towards the conclusion of the experiment, he placed the flame of a candle to this hole : the inflammable gas immediately burned with a large bright flame ; to extinguish this, he struck it with his hat : the flame was driven inwards, the gas in the inside of the apparatus took fire as quickly as gun-powder, and exploded with a report like a cannon, driving out the wooden plug to a great distance, and exhibiting a cylindrical body of fire of several yards in length ; the heavy cast metal pumps were removed from their places. From this time he considered his project of lighting collieries and rooms with gas lights as very dangerous ; and I record this experiment with a view, that it may probably be a useful hint to those, who are at present engaged in similar projects, of lighting manufactories and great towns, with a material so subject to explosion.

Paper Mills.

Of this species of manufacture, there are two on Der-

went, one on Team, at Lamesley, four on Tursdale Beck, viz: Croxdale, Tursdale, Cornforth, and Thinford, and one upon Browney, at Stone Bridge House.

Woollen, Cotton, and Linen Manufactures.

Durham, a few years since, had a considerable worsted manufacture of tammies, wildböres, &c. and carpets; but Mr Startforth, the principal, failing; the trade failed with him, and is now revived by Mr Cooper, who claimed the buildings, work shops, &c. left in trust to the corporation, to be let rent free, and 500*l.* to be lent without interest, for the purpose of encouraging the woollen manufactory, to any one binding himself to employ a sufficient capital for carrying on that business.

In 1792, Messrs Burdon and Salvins began a manufacture of corduroys and other cotton goods, at Castle Eden, in which about 200 boys and girls were employed in spinning*, besides a number of men in weaving, cutting, &c. This they removed to Durham in 1796, but the buildings were unfortunately burned down a few years since, which have not been rebuilt, and the cotton manufactory of course has ceased.

Darlington has been long famous for its linen manufactures of huckaback, diapers, and sheeting, which employ about 500 looms.

It has also a worsted manufactory of camblets, wildböres, bombazets, and tammies or durants: the two latter are spun by hand; the former by machines: in these

* The buildings at Castle Eden were converted into a sail cloth manufactory, which failed; and last year they were taken down, and the materials sold.

are employed about 300 looms, 100 combers, and 5000 spinners by hand, besides a considerable quantity being sent into Scotland to spin. Mr Pease alone has paid 800*l.* a year for spinning in Scotland.

It was here that the mills for spinning flax were first invented by the ingenious Mr John Kendry* and Mr Porthouse: of those mills there are four, and one for spinning worsted; here are also mills for dressing Chamois leather, and for grinding and polishing spectacle glasses.

Barnardcastle about 50 years since, and for many years before, had an extensive manufactory of worsted goods; but the manufacturers, in order to undersell each other, made their goods so very inferior, that in a few years they offended and lost their customers, and the workmen were obliged to go by degrees to Durlam, Darlington, and other places, where the trade was under better regulations.

SECT. IX.—COMMERCE.

THE commerce of this county is principally from South Shields, Sunderland, and Stockton. The quan-

* This very ingenious and worthy man was the first that invented the mode of grinding optical glasses of a true spherical form, by machinery: he neglected to get a patent, and it was meanly stolen by some person of superior capital, near Sheffield, who engrossed nearly all the demand, by having riders to take in orders in every part of the kingdom.

tity and value of the exports and imports cannot be obtained, as the collectors of the customs are prohibited by government from making any thing of this kind public. I therefore can only give what I have been able to procure from former documents, and from the information of friends.

South Shields

Has risen into consequence as a place of commerce, of late years, there being in 1740, only four ships belonging to it, which taken at 200 tons each, is 800 tons: at present (1809) the amount of tonnage of ships belonging to this town, is 40,343 tons, which in the last 70 years is an increase in the ratio of 1 to 50.

At the period above mentioned, the principal trade of the place was making salt, there being at that time 130 salt pans, which are now reduced to 17; but these have given way to the various branches of trade connected with shipping, there being at present

- 4 Ship-building yards, with docks adjoining;
- 1 Ditto without a dock;
- 7 Boat-building yards;
- 4 Dry docks;
- 4 Docks, that hold two vessels of the largest size;
- 4 Ditto, that hold one vessel;
- 6 Roperies: three of them patent; two of which are wrought by steam.

In 1792, there belonged to the port of Newcastle (of

which North and South Shields are the principal members) 541 ships, their tonnage 119,051; and in 1805, the number was 711, and tonnage 154,550*.

By the accounts presented to the House of Commons, of ships built in Great Britain in different years from 1790 to 1806, it appears that the vessels built at the port of Newcastle were as follows:

<i>Year.</i>	<i>Number.</i>	<i>Average tonnage.</i>	<i>Tonnage of largest.</i>
1790	32	206	370
1791	27	216	448
1804	36	252	524
1805	25	238	673

The whole town belongs to the Dean and Chapter of Durham, (except what was enfranchised for purchasing the land tax,) who let leases for twenty-one years, renewable every seven years, on paying a fine of one year's rent. It was formerly a very insignificant place, but increased so much, that in 1770, Bishop Trevor granted two fairs yearly, on the 24th June and 1st September, and a weekly market on Wednesday, which had become very necessary, the population in 1801, being upwards of 10,000; and in 1809, it was estimated to be considerably more.

* Account of British built ships, published by the House of Commons in 1806.

Sunderland.

This place, like Shields, has greatly increased in population and commerce of late years. In 1719, it is stated in the preamble to an act of Parliament for making the township of Sunderland a distinct parish from Bishopwearmouth, that the inhabitants of Sunderland were so greatly increased, as to contain 6000 souls. The population in 1801, as returned to the House of Commons, of the town of Sunderland, was 12,412, besides the seamen and keelmen, 1571. At this period the number of inhabitants of the two Wearmouths amounted to 12,034, making in the whole 26,030.

Mr Hutchinson, in his History of the County, states, " That in 1752, there belonged to this port alone, about " 190 ships. In 1748, there were loaded in this port " 2497 ships; and in 1752,

There were	-	3424	cleared coastwise.
And	- . -	173	for foreign ports.

Total	3597
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" Besides a number of small sloops of 20 or 30 tons
 " burthen, that carry about 10,000 tons of lime from this
 " port in the summer season.

" In 1776, there were 350 vessels and upwards be-
 " longing to this port; and from the 5th July to the
 " 10th August, there were cleared at the custom-house
 " 980 sail of ships, coal laden, and above 100 vessels

“ with lime ; and in one year 5,700 vessels cleared here : this navigation was performed by about 1,100 different vessels.*”

In 1792, by the accounts presented to the House of Commons of the number and tonnage of British built ships belonging to each port in the kingdom, Sunderland is stated to have 390 ships, and their tonnage 57,082.

The following table exhibits an accurate account of the number of ships belonging to this port from 1800 to 1808, their tonnage, and number of men employed in navigating them.

<i>Year.</i>	<i>Number of ships.</i>	<i>Tonnage.</i>	<i>Number of men.</i>
1800	514	76,571	3,557
1801	518	79,795	3,579
1802	503	74,535	3,501
1803	543	80,859	3,747
1804	563	80,685	3,794
1805	541	76,544	3,508
1806	522	72,443	3,366
1807	503	68,511	3,298
1808	480	65,543	3,197

From the above it appears, that on the average of the last nine years, there were about 75,054 tons of shipping belonging to this port.

Those of large burden are in time of war mostly employed in the transport service ; and in time of peace, in the Baltic trade : the small ones are constantly in the coal trade.

* Hutchinson's History of Durham.

There are about 50 vessels of from 50 to 100 tons burden belonging to this port, employed in carrying lime to Scotland, and along the Yorkshire coast; there are also several in this trade that do not belong to the port.'

By the account delivered to the House of Commons in 1806, the number of ships built at this port in different years, were as in the following table :

<i>Years.</i>	<i>Number.</i>	<i>Average tonnage.</i>	<i>Tonnage of largest.</i>
1790	19	144	312
1791	6	202	356
1804	51	163	349
1805	36	163	337

The foreign trade of this port was presented to Mr Hutchinson, for his History of the County, by Mr Geo. Thompson, surveyor of the customs.

Exports.

1776.

" Coals to Holland, Germany, France, & Russia	} 35912 chaldrons
" Copperas	318 tons
" Green glass	4393 cwts. 0 qrs. 6 lbs.
" Grindstones	207 chaldrons
" Earthen ware	67 crates
" Stockings	472 dozen

1779.

" Coals to Holland, Germany, France, & Russia	} 27438 chaldrons
" Copperas	376 tons
" Grindstones	225 chaldrons
" Earthen ware	153 crates and 10 casks
" Stockings	177 dozen
" Green glass bottles	6584
" Hops	12 pockets and 13 bags
" Anchors	3 (qr) 1 ton 17 0 0
" Oakum	1 ton
" Sail cloth	18 belts 563 ells
" Lint	4 0 12
" India silks condemned	342 yards

" During the war, the trade was greatly diminished ;
 " but in peace 36,000 or 37,000 chaldrons of coals were
 " about the mean quantity exported to foreign parts.

Imports.

1779.

From Holland.

" Rough flax	(656) 0 2 23
" Wainscot board	4501
" Geneva	14 tons 251 gallons
" Brandy	7 do 229 do

" Marble gravestones	2
" 19 sails	865 ells
" Olives	9 gallons
" Duck or Holland sail cloth	} 28 ells

From Norway.

	C.	Q.	lb.
" Deals under 20 feet	266	6	0
" Half ditto	43	3	7
" Battens	256	3	12
" Paling boards	128	3	10
" Small balks	18	0	6
" Middle balks	28	3	5
" Fir timber	1070	load	41 feet
" Small spars	25	cwt.	3 qr. 2 lb.
" Handspikes	29	cwt.	0 qr. 9 lb.
" Tar	18	lasts	12 barrels
" Oak knees	3	cwt.	
" Capravens	1	cwt.	0 qr. 28 lb.
" Fire wood	10	fathom	
" Oars	40	pair	

From Sweden.

	C.	Q.	lb.
" Deals above 20 feet	55	1	23
" Battens	13	1	13
" Iron (91 tons)	14	0	18
" Rough flax	117	3	18

From Germany.

" Oak plank	24 loads 21 feet
" Oak timber	17 ditto 11
" Oak knees for shipping	1 2 21
" Ditto for wherries	1 1 10 "

Imports of single Brandy from 1788 to 1799.

<i>Year.</i>	<i>Gallons.</i>	<i>Duties.</i>
		£
1788	27589	5863
1789	34119	7250
1790	33676	7576
1791	32480	6902
1792	30440	7737
1793	31481	8001
1794	42415	11350
1795	21282	6296
1796	2333	787
1797	1152	389
1798	641	243
1799	959	363

There has been no spirits imported at Sunderland since 1799, in consequence of the war with France and Holland, and Newcastle being a bonding port.

Sunderland was made a bonding port in 1808, for wine and spirits, and 176 pipes of wine were bonded in that year.

Account of Coals and Cinders sent coastwise from this port, and of coals exported to foreign parts, from 1791 to 1808.

Year.	Sent coastwise.		Exported to foreign parts.
	Chaldrons of Coals.	Cinders.	Chaldrons of coals.
1791	245864	844	54150
1792	206241	648	53311
1793	254171	840	59064
1794	243064	875	38885
1795	282162	784	5884
1796	249758	487	6293
1797	275889	692	6434
1798	273645	487	5111
1799	297824	746	4039
1800	298837	616	4622
1801	231018	396	4757
1802	305075	528	31205
1803	298946	457	10167
1804	299552	168	4162
1805	313008	322	5955
1806	306271	282	2613
1807	288938	380	4276
1808	348623	316	2058

*An account of the amount of Duties received at this port
from 1788 to 1808, for exports and imports.*

<i>Year.</i>	<i>Exports.</i>	<i>Imports.</i>
	£	£
1788	35,078	3,764
1789	30,213	3,791
1790	35,529	4,529
1791	40,842	4,725
1792	41,251	4,735
1793	37,206	5,694
1794	28,302	5,948
1795	6,799	4,996
1796	6,490	5,412
1797	8,825	3,041
1798	6,360	6,127
1799	5,483	6,608
1800	6,397	5,084
1801	5,844	3,950
1802	38,422	7,801
1803	12,427	10,925
1804	6,761	6,803
1805	8,944	6,133
1806	3,999	7,266
1807	6,135	8,121
1808	2,330	1,476

The harbour may be reckoned almost a dry one, except at tide time, when the flow varies in spring tides from 15 feet to 16 feet 4 inches, and in neap tides from 10 feet 10 inches to 11 feet 5 inches. To improve and preserve the harbour, great sums of money have been expended, and temporary works joined to the permanent piers, which extend on both sides the river almost to the

bar. Upon the north pier, a beautiful light house is erected. These piers render the channel very narrow, but proportionably deep: vessels of 300 or 400 tons burden now come and go with great safety, which was not the case before the erection of these piers; the harbour being then so shallow, that ships were obliged to take in their loading in the open sea, at the mouth of the river, which was frequently attended with great danger to the keelmen. The first attempt to improve the harbour was about the year 1670, when Charles II. granted his letters patent for building a pier and light house, and for cleansing the harbour. In 1785, the pier on the south side of the river being found insufficient for keeping the entrance open, another on the north side, nearly 300 yards in length, has been erected of late years, for the purpose of narrowing and deepening the channel, to increase the depth of water on the bar, so as ships of the above burden might come into the harbour with safety. Near the end of the south pier, which is 1000 feet in length, a tide light is erected, to indicate when there is a sufficiency of water for vessels to enter the harbour, which will hold 600 ships. About 150,000*l.* has been expended upon the harbour, pier, and river; and it will require much more to complete the works in contemplation, as it is intended to carry them over the bar. The money is raised by a duty on coals: the coal-owners paying 3*d.* per chaldron, and the fitters 1*d.* The shipping pay nothing.

Stockton.

As nothing can now be procured from the Custom-House relative to the trade of this port, I shall take the
DURHAM.]

liberty of extracting from the Rev. Mr Brewster's History of Stockton, an accurate and authentic account which he had the permission of the commissioners of the Board of Customs for obtaining.

“ Exports of corn at different periods to foreign parts.

<i>Year.</i>	<i>Wheat.</i>	<i>Rye.</i>	<i>Barley.</i>
	<i>Qrs.</i>	<i>Qrs.</i>	<i>Qrs.</i>
1749	35400	5387	
1760	35863	679	
1761	25897	603	600
1786	451		
1787	370		
1792	1956		
1794	nothing		

“ Exports of Lead at different periods to foreign parts.

<i>Year.</i>	<i>Tons. cwt. qrs. lbs.</i>			
1756	2431	10	1	14
1757	2245	12	1	0
1758	1425	9	0	0
1791	428	11	2	14
1792	339	14	3	0
1793	310	3	2	10
1794	522	8	2	16

“ Of late years great quantities of lead, from the
 “ mines in the North Riding of Yorkshire have been
 “ sent to Hull, the produce of which mines was formerly
 “ brought to this port.

" Account of Goods exported to foreign parts.

" Ale	29 barrels
" Allum	16 tons
" Bricks	15 thousand
" Butter	10 firkins
" Calico printed	967 yards
" Cloth linen	800 yards
" Cloth woollen	714 ditto
" Flannel	398 ditto
" Fustian	43 ditto
" Haberdashery	5 cwt. 2 qrs. 14 lbs.
" Handkerchiefs cotton	4 dozen
" Ditto British silk	2 dozen
" Ditto foreign silk	371 yards
" Hats men's	9 dozen
" Lead	339 tons 14 cwt. 3 qrs. 0 lbs.
" Lint	47 2 0 24
" Pantiles	1000
" Sail cloth	2280 ells
" Shag worsted	36 yards
" Stockings cotton	7½ dozen
" Ditto woollen	5825 dozen pairs
" Stuffs woollen	953 yards
" Tow	83 cwt.
" Wheat British	1956 qrs.
" Ditto foreign	518 qrs. 3 bush.

" Account of Goods imported from foreign parts in 1792.

" Bottles glass	2 quarts 3 lbs weight
" Bottles stone	12 dozen
" Bristles undressed	546 dozen lbs.
" Bullrushes	1 load 6 bundles
" Calves skins undressed	77 dozen and 3
" Canvas packing	21 ells
" Clover seed	270 cwts. 3 qrs. 19 lbs.
" Cordage	36 cwt. 1 qr.
" Cotton wool	627 lbs.
" Flax rough	7672 cwt. 2 qrs. 3 lbs.
" Geneva	9904 gallons
" Gravestones marble unpolished	} 78 feet super.
" Hemp rough	
" Hides horse in the hair	1962 cwt. 2 qrs. 16 lbs.
" Hides ox & cow in the hair	} 348
" Iron in bars	591
" Linen Russia	853 tons 7 cwt. 1 qr. 27 lbs.
" Linseed	19 cwt. 1 qr.
" Linseed cakes	4160 bushels
" Mats Russia	8 tons
" Matting Holland	600
" Millstones	72 yards
" Oakum	2
" Oak bark	3 cwt.
" Oats	1843 cwt. 2 qrs. 21 lbs.
" Oil, produce of 2 whales	138 qrs. 4 bushs.
	28 tons 197 gallons

" Onions	22 bushs.
" Onion seed	1 cwt. 10 lbs.
" Pantiles	1100
" Plumbs dried	20 lbs.
" Pots chamber	10 dozen
" Rags and ropes old	5 cwt. 2 qrs. 17 lbs.
" Sails foreign made	1
" Sail cloth	2 qrs. 16 ells
" Seal skins undressed	50
" Seltzer water	8 dozen 4 bottles
" Sheep skins undressed	6
" Ditto pieces of undressed	10 cwt.
" Smalts	1553 lbs.
" Tar	1 last
" Tarras	8 bushels
" Tow	35 cwt. 1 qr. 18 lbs.
" Trees	6 bundles
" Vinegar	5 gallons
" Whale fins	29 cwt. 1 qr. 16 lbs.
" Wine Portugal	51 tons 56 gallons
" Wine Rhenish	74 gallons
" Yarn linen	258449 lbs.

" *Wood.*

" Axle trees	1 cwt. 1 qr. 16 lbs.
" Balcoons oak	2 qrs. 12 lbs.
" Balks fir	4 cwt. 16 lbs.
" Battens	52 cwt. 3 qrs. 10 lbs.
" Deals	371 cwt. 2 qrs. 23 lbs.
" Deal ends	19 cwt. 13 lbs.

" Fir timber	2825 loads 1 foot
" Handspikes	8 cwt. 2 qrs. 12 lbs.
" Harrow bulls	24 lbs.
" Jointing laths	90 bundles
" Lath wood	49 fathom
" Marts 6 inches & under	8.—8
" Do. 8 inches & under	12.5
" Do. 12 inches & upwards	5.
" Oars	3 qrs.
" Paling boards	5 cwt. 16 lbs.
" Spars	2 cwt. 8 lbs.
" Staves	28 cwt. 2 qrs.
" Tree nails	4000
" Wainscot logs	111 loads 18 feet

Imports at different periods from foreign parts.

Year.	Flax.		Hemp.		Iron.		Fir timber.		Deals & battens.		Wine & brandy.		Panilla.			
	cwt.	grs.	lbs.	cwt.	grs.	lbs.	loads.	feet.	cwt.	grs.	lbs.	No.				
1766	4010	0	0	1178	3	0	432	13	0	22	1885	10871	0	19	1832	9850
1767	4766	0	0	961	2	5	306	1	0	14	2001	5909	1	19	1455	6500
1768	3625	3	12	670	1	13	501	19	2	2	1695	35755	0	2	1522	8700

" Particular Goods brought and carried coastwise.

Year.	Butter.	Cheese.	Pork.	Hams.	Tallow.	Alc.
	<i>Firkins.</i>	<i>tons. cwt.</i>	<i>Barrels.</i>	<i>Hogheads.</i>	<i>Cuts.</i>	<i>Casks.</i>
1766	21513	241 0	623	490	1252	372
1767	23796	272 14	1115	601	2208	392
1768	26406	287 4	1100	663	1793	1011

Year.	Lead.	Alum.	Sail cloth.	Linens.	Oak timber.	Parilla.
	<i>tons. cwt.</i>	<i>tons. cwt.</i>	<i>Bells.</i>	<i>Bells.</i>	<i>Tons.</i>	<i>N^{os}.</i>
1766	1302 0	495 0	1883	162	345	9000
1767	1351 14	907 19	1897	218	105	9000
1768	2069 11	768 16	2571	292	288	3000

" Corn and Flour carried coastwise.

<i>Years.</i>	<i>Wheat flour.</i>	<i>Wheat.</i>	<i>Barley.</i>	<i>Oats.</i>
	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
1785	2278	6311	20	21334
1786	2930	3038	60	12227
1794	4954	12927	291	16212

*" Particular Goods sent coastwise to London,
" at different periods.*

<i>Years.</i>	<i>Lead.</i>		<i>Wheat.</i>	<i>Oats.</i>	<i>Butter.</i>	<i>Pork.</i>
	<i>tons.</i>	<i>cwtts.</i>	<i>Qrs.</i>	<i>Qrs.</i>	<i>Firkins.</i>	<i>Casks.</i>
1790	2118	18	1158	11849	17841	1150
1791	2267	0		6738	15040	1062
1794	2818	10	1585	16212	18145	1161

" 1790. *Hams*, 287 hogsheads, 593 casks, 195 parcels, 20 hampers, and 290 loose hams.

" 1791. Ditto, 978 hogsheads and casks of hams.

" 1794. Ditto, 176 hogsheads, 297 hampers and mats, and 490 loose hams.

129 hogsheads, 3 mats of beef and tongues.

" 1790. 281 bales and 10 cases linen and woollen.

" 1791. 344 ditto, and 8 ditto ditto ditto.

*" Particular Goods brought coastwise from London at
 " different periods, to this port.*

	Sugar.		Tea.	Tobacco and Snuff.	Salt.	Molasses.	Vinegar.	Hops.
	tons.	cwt.	lbs.	lbs.	tons.	hhd.	cask.	cwt.
1776	893	8		107,616	487	989	265	2229
1777	690	18		114,083	452	922	290	1135
1778	760	1		111,359	533	898	297	1849
1780	1127	10	1,793	108,935				
1790			89,088	62,498 †				
1794	1510	10*	111,712 †					

* " Sugar being this year at 84*l.* a ton, the value imported is
 " 126,882*l.*

† " The average price of tea 4*s.* per lb. amounts to 22,342*l.* From
 " the great difference of tea brought from London in 1780 and 1790,
 " plainly appears the utility of the commutation act, which took place
 " between those periods. Great quantities of tea were smuggled in
 " this district before the said act passed.

‡ " The great inequality of the quantities in 1780 and 1790, shews
 " what large quantities were smuggled in those parts, owing to the
 " high duty.

"Receipts of the Customs of this port for three periods of ten years each."

	£.	s.	d.	£.	s.	d.	£.	s.	d.
1714	3936	11	0½	1751	4957	8	8½	1785	6471 12 5
1715	5231	10	3½	1752	5087	14	4½	1786	6245 13 6½
1716	3676	2	6½	1753	3832	12	8	1787	6096 8 7½
1717	4102	2	9½	1754	4815	13	1	1788	6327 7 4½
1718	5024	2	4	1755	4753	14	8½	1789	4978 15 11
1719	3546	3	6½	1756	6240	14	1	1790	7132 13 11½
1720	5267	3	0	1757	4579	6	10½	1791	6701 10 2½
1721	3462	2	9½	1758	4613	12	2½	1792	7460 5 4½
1722	4175	12	8½	1759	3962	7	6½	1793	6190 9 7½
1723	3319	8	3½	1760	4638	7	2	1794	5485 17 10½

“ Receipts of the Customs at Newcastle, Sunderland, and Stockton, for the years 1781 and 1784.

<i>Year.</i>	<i>Newcastle.</i>			<i>Sunderland.</i>			<i>Stockton.</i>		
	<i>£.</i>	<i>s.</i>	<i>d.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>
1781	40,759	4	2	5,349	2	9	2,836	13	1
1784	62,025	4	0	37,365	2	0	5,456	17	6

“ It is an agreeable speculation to observe the difference between a year of *peace* and a year of *war*.
 “ The above comparative view is worth a whole volume
 “ on the subject.

“ In 1795 there were 47 vessels belonging to the port of Stockton, carrying 5730 tons per register.”

In 1805, by the accounts delivered to the House of Commons, there belonged to this port 46 vessels, their burden 5244 tons.

In 1802 a committee was appointed to enquire into the utility of making a cut across the neck of land between Stockton and Portrack. In their report they state, that they have taken great pains to ascertain the amount of the tonnage of vessels which load and deliver at this port, and are able to state from authentic data, the average of the preceding sixteen years as follows :

	<i>Tons.</i>
The amount of vessels trading coastwise	18344
British ships importing foreign goods	4992
Foreign ships with foreign goods	1198
Total	24534

By the returns to the House of Commons, in 1806, the ships built at this place in particular years were—

<i>Years.</i>	<i>Number.</i>	<i>Average tonnage.</i>	<i>Tonnage of largest.</i>
1790	4	103	320
1791	5	131	318
1804	5	150	296
1805	3	83	130

SECT. X.—THE POOR.

THE poor are well provided for, and mostly in a very comfortable state, being generally relieved at home, in small parishes, the magistrates ordering them ample allowance in case of complaint, which varies from 1s. to 7s. per week, according as they are able to make some endeavour by their own earnings, or are entirely disabled from working; but it often happens that the most worthless, indolent, and abandoned, are the first and most clamorous in their complaints, and frequently obtain a larger allowance than the modest and humble sufferers that are much more deserving.

In extensive parishes and populous districts, the inhabitants have found it necessary to have work-houses, as at Darlington, Stockton, Sunderland, &c.

In the township of Darlington, the poor are managed under the act of the 22nd of Geo. III. A visitor and two guardians of the poor are annually appointed, who

provide both provisions and cloathing: a governor and governess are hired by them, who live in the work-house, and are allowed a weekly salary. The visitor and guardians hold weekly meetings, to discuss and determine such matters relating to the poor, as the governor sees necessary to lay before them; and also to hear complaints and relieve such of their poor as are not members of the house. A doctor is appointed, with an annual salary, to attend the poor in the house, and all the out-poor in the township. Under the above act a new work-house was erected last year. The food of the poor is regulated by a bill of fare, but which is varied according to circumstances. There are no particular regulations with respect to cloathing. Such of the poor in the house as are able to work, are mostly employed in the manufactories of the town, such as spinning mills, weaving, &c. Their earnings are brought weekly to the Cr. of the township.

The annual amount raised by the poor's rate, for the last five years, has amounted to 1750*l.*: during that period houses have paid three shillings in the pound, and land four shillings and sixpence. Two overseers are appointed, whose business it is to collect the rate only.

In the management of the poor of Stockton, it was suggested a few years since, that by dividing the town into districts, and selecting from each a certain number of respectable inhabitants, a general committee might be formed, under whose superintendence, the poor-rate might be kept under, and the poor better provided for. The idea was, that those inhabitants, by a little enquiry in their respective districts, might give more correct information as to the state of the out-paupers, at each

weekly meeting, than was likely to be obtained through the medium of overseers, who are in general glad to execute the office with the least trouble to themselves, and frequently commit it to the care of those who have no other inducement for the undertaking, than pecuniary advantage. This plan being adopted, the committee meet once a quarter, at the poor-house, for general purposes, and at that meeting they elect a sub-committee for the ensuing quarter, who meet on every Tuesday at the poor-house, to enquire into the past, and regulate the future conduct of the master of it, and also of the overseer, and to decide upon all applications for relief to out-paupers.

Relief to paupers at a distance, is invariably refused or withheld until a certificate be produced, signed by the minister of the parish, the overseer of the poor, and some respectable inhabitant of the place, and neighbour to the claimant, stating his age, number of his family, and their ages, earnings per week, the cause of his necessity, and that he is a proper object of parish relief.]

The number of paupers in the house are generally from 25 to 30, for which the master is paid four shillings per head per week : to out-paupers the allowance never exceeds two shillings per week per head, except in very particular cases : of this description there are at present upwards of 200 families relieved.

The whole expence, on an average, is 1800*l.* a year. The present poor-rate is four shillings a pound for land, and three shillings for houses.

Those in the house that are able, are employed in opening oakum, drawing rope yarn, &c. : their earnings are very trifling, seldom reaching 20*l.* a year, which is accounted for to the parish by the overseer.

Their food is regulated by a bill of fare : the breakfast is always boiled milk, with seven ounces of bread ; the dinners and suppers as follows :

Sunday.

Dinner—Beef or mutton, with potatoes, broth, and bread.

Supper—Broth, with seven ounces of bread.

Monday.

Dinner—Broth, with seven ounces of bread.

Supper—Boiled or cold milk, with seven ounces of bread.

Tuesday.

Dinner—Beef hashed with potatoes and bread.

Supper—Boiled or cold milk, with seven ounces of bread.

Wednesday.

Dinner—Frumety*.

Supper—Boiled or cold milk, with seven ounces of bread.

Thursday.

Dinner—Beef or mutton, with potatoes and broth and bread.

Supper—Broth or milk, with seven ounces of bread.

* Shelled wheat or barley, boiled with milk, and sweetened with sugar or treacle.

Friday.

Dinner—Broth, with seven ounces of bread.

Supper—Boiled or cold milk, with seven ounces of bread.

Saturday.

Dinner—Hasty pudding or milk, with seven ounces of bread.

Supper—Boiled or cold milk, with seven ounces of bread.

Sunderland.

The poor rates of Sunderland, like many other places, have encreased very much of late years.

	RATES ASSESSED.			EXPENDITURE.		
	£.	s.	d.	£.	s.	d.
In 1791	2103	7	9	1892	17	6
1800	4243	18	3	3965	15	3
1809	6790	11	10	7058	3	0

A considerable number of poor coming upon the parish on account of the shipping, an act of Parliament was passed in 31 Geo. III. by which a rate or duty of 2d. per ton per annum was laid upon all ships belonging the port, which at that time amounted to about 740*l.* per year. This act not answering the purpose, it was repealed in 1809, and a new one was obtained, by which ships in future are to contribute a half-penny per ton per month, with a power to extend it as far as a penny per ton per month, and the agreement is, that the inhabitants

DURHAM.]

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are to pay one half, and the shipping interest the other half of what is found necessary for the support of the sailor poor.

A part of the poor of Sunderland are maintained in the work-house, but the greatest portion are relieved at their own residences. The whole are under the management of a visitor and four guardians, who employ a person as master or governor, for the management of the work-house, at a salary of 50*l.* per year; and also a clerk to keep the accounts, whose salary is 40*l.* a year.

Provisions, clothes, and every other necessary, are purchased by direction of the guardians, and the master weighs and measures all the articles that are left on hand at the end of every week, in order to ascertain what has been consumed in the course of the week; and the clerk inserts in his book the quantities of each article that has been consumed, and also what is left on hand, the prices, &c. as in the following

“Weekly Account of Provisions received and expended in the Work-house at Sunderland, from 16th December, to 23rd December, 1807, inclusive.”

	Left last week.		Rec. this week.		Total received.		Left this week.		Expended.		Price.		Total.		
	st.	lb.	st.	lb.	st.	lb.	st.	lb.	st.	lb.	s.	d.	£.	s.	d.
Beef and mutton	3	7	12	5	15	12	4	0	11	12	6	0	3	11	1
Bread	220	loav.	222	loav.	442	loav.	130	loav.	312	loav.	0	6	7	16	0
Flour	15	0	0	0	15	0	9	0	6	0	3	0	0	18	0
Oatmeal	13	0	16	0	29	0	20	0	9	0	2	4½	1	1	4½
Barley	1	0	8	0	9	0	7	0	2	0	2	0	0	4	0
Potatoes													0	9	0
Beer	0	1½	0	3	0	4½	0	2	0	2½	0	9	0	1	10½
Candles	1	0	4	0	5	0	3	7	1	7	4	4	0	6	6
Salt			£3*	9½				12½	10	4	0	8½	2	10	4
Milk	0	10			0	10	0	5	0	5	0	0	0	3	6½
Soap		5¼		9½	£0	14½		7½	£0	7½			0	4	7
Groceries, &c.															
Sundries															
Paupers for allowance in- stead of beef & bread													6	18	7
Paid servants in house													0	13	10
													25	12	9
													2	17	10
													22	14	11

* £3 9½ signifies 3l. 3s. 2d. and 12½d. £9 12s. 10d.

Earnings

Earnings

* £3 9½ signifies 3*l.* 3*s.* 2*d.* and 12½ 10*d.* £9 12*s.* 10*d.*

" Servants in the house, 11 men and 10 women	21	
" Paupers ditto, men 39	}	176
women 83		
children 54		
" Born in the house		
" Received into ditto		
" Dead		
" Discharged		
		197
" Ran away, 2 women		2
		195"

It appears from the above account of the weekly expenditure, which is copied from the book kept by the clerk of the work-house, that the average expence of food per week of the 195 persons in the house, is 2s. 4d. per head.

In 1807, the guardians first published an account of the names of the paupers, their places of residence, and weekly allowance to each, which is prefaced with the following observations :

" The visitor and guardians of the poor, considering
 " it proper that every person rated to the support of the
 " poor, should be acquainted with the application of
 " their money, do in pursuance of their duty, publish
 " the following list of persons receiving weekly relief.

" It is hoped a saving might be made to the parish, if
 " house-holders would take the trouble to enquire into
 " the real wants of their necessitous neighbours, and
 " give such information to the governor, at the work-

“ house, as would enable the visitor and guardians to
“ discriminate between the idle and industrious, and
“ between those who are entitled by real indigence to
“ receive parochial relief, and those who by false pre-
“ tences of poverty defraud the town.

“ Such information is the more necessary, as there
“ is reason to fear a considerable part of the money paid
“ out of the work-house, is spent in spiritous liquors,
“ and other ways alike destructive to industry and
“ morality.”

By this account there were 420 relieved at their own residences belonging the town, and of sailor poor 203, and on an average there was maintained in the work-house 186, making in all 809.

By the first annual printed report of the guardians of the poor, of the expenditure and receipts from the 30th of April, 1808, to the 29th of April, 1809, the total expenditure was 6,900*l.* 15*s.* 0*d.* The average poor people in the house weekly 205, and the average expence of food per head, weekly, 3*s.* 1*d.*

The earnings of this year by paupers in the house, exclusive of oakum teasing, was 73*l.* 5*s.* 5*d.*

The parish of Gateshead has a work-house under the direction of the church-wardens and overseers, and managed by a person who has a salary of 80*l.* a year, who purchases provisions, clothes, &c. The earnings by work are brought to the credit of the parish. Many are relieved at their own residences.

At Stanhope, in Weardale, the management of the poor is not conducted upon such well regulated principles

as those above related. The keeping of the work-house is let by proposal for a stipulated sum per year.

The amount of rents in the parish of Stanhope is 14,016*l.* upon which rental, on an average of four years, there has been 2*s.* 3*d.* per pound collected, which amounts to 1576*l.* The sum paid for the support of the poor on the average of the four last years, is 906*l.* : the remainder 670*l.* goes towards raising militia men, supporting their families, purchasing furniture, bedding, &c. for the work-house, paying county rates, &c.

The poor in other parts of the county are supported in a manner similar to some one or other of the above modes.

Box Clubs.

These excellent institutions are very numerous in this county, there being several in all the principal towns, and scarcely a village of moderate size without one or more : as at Winlaton there are three for men, and three for women. In those for men, each member pays into the box one shilling every six weeks, and when sick they receive from 4 to 6 shillings per week, as settled by a majority of members at the annual meeting. When a member dies, his wife or relatives receives 6*l.* or 7*l.* for the expences of his funeral : when a member's wife dies, he receives from 3*l.* to 4*l.* for the same purpose ; and for a child under 21 years of age, and unmarried, sixpence from each member.

The rules of the female societies are, for each member to pay into the box 7½*d.* each, every four weeks ; and they receive at the death of their husbands from 3*l.* to

4*l.*; and for a child, 4*d.* from each member; and at the death of a member, 6*l.* is paid to the nearest relatives. On these different occasions each member pays one shilling, nine-pence, or four-pence, by way of re-instating the capital of the box.

The rules of a society of this kind at Stanhope, are— for each member to contribute one shilling every six weeks, and to receive five shillings per week when sick; but if the sickness continues more than six weeks, he is after that period allowed only four shillings per week; and the same sum, if disabled from working by age or infirmity; at the death of a member, 5*l.* is paid to his wife or relations, towards defraying the expences of his funeral.

In this society there are 170 members, and their capital is upwards of 150*l.*

The various other clubs in different parts of the county are regulated by rules similar to the above.

Associations of this kind are undoubtedly of the greatest advantage, as every contributor has the satisfaction of looking forward for a certain and comfortable support in sickness and in old age, and the prospect is brightened by the reflection, that it is the fruit of his own industry, and that he will not be under the necessity in the day of calamity and distress, to ask relief from the funds of the parish, or be degraded by becoming the resident of a work-house. Whilst this independent spirit prevails, those excellent societies will continue to flourish; but I am afraid this virtuous pride of independence is fast declining, as several of those box clubs have been dissolved of late years, principally occasioned by a few selfish and turbulent members: a majority of the

younger members, of this disposition, about two years since dissolved an association of this kind at Cockfield, (which had been established nearly fifty years) and divided the capital, for the sake of getting about three pounds each, to the great dissatisfaction and prejudice of several old members, who had some of them contributed to the box nearly forty years, and had never had occasion, during that period, to draw any thing from it. The principal reason given for so unjustifiable a transaction, I was much concerned to hear, was, that they had no occasion to contribute any thing towards their own support, as the parish was obliged to maintain them; and the weekly allowance that a magistrate would order them, would be more than what they would receive from the society.

The advantages of these associations are, that they evidently tend to create a spirit of independence and industry, and to keep down the poor rates, by the members providing a fund for their own support in sickness and old age, by such small monthly sums as scarcely to be felt by them, and which, if not saved in this way, would (in nine instances out of ten) be wasted in ale houses or other needless extravagancies, and lay the foundation of habits of dissipation and immorality.

The following Table, shewing the amount of poor-rates, number of persons relieved, and number of friendly societies, is extracted from the returns made to the House of Commons in 1803.

Districts.	Amount of rates in						Average per pound in 1803.	Number of persons relieved, Out of work-house.		No. of them.	Friendly Societies, No. of members.	
	1776.		Average of 1783, 1784, and 1785.		1803.							
	L.	s. d.	L.	s. d.	L.	s. d.	L.	s. d.				
<i>Clester Ward.</i>												
East division	1659	10 5	2903	6 10	11415	3 9	0 3	4½	1142	163	50	3872
Middle ditto	2383	13 9	2601	13 6	6869	5 5	0 2	10½	732	63	26	1360
West ditto	1420	8 11	1801	13 0	5699	19 8	0 2	6	643	47	25	1564
<i>Durlington Ward.</i>												
South east division	2142	8 11	2077	17 9	6711	12 10	0 2	5	665	67	10	494
South west ditto	1258	8 3	1346	17 6	5518	12 6	0 2	6½	408	94	9	579
North west ditto	2124	9 9	2264	17 6	8812	2 10	0 2	2	860	55	7	600
<i>Easington Ward.</i>												
North division	2960	0 3	3263	7 1	5302	1 1	0 2	8½	678	32	2	127
South division	1215	17 3	1005	9 8	2441	7 0	0 1	8	170	7	1	135
<i>Stanton Ward.</i>												
North east division	1600	2 3	1195	10 3	3833	14 3	0 0	11½	322	12	2	156
South west ditto	1675	6 10	1852	15 5	5332	15 2	0 2	1½	516	41	15	940
Durham city	265	6 4	451	8 1	863	7 5	0 8	4	84	16	7	262
Sunderland town	1175	4 3	1298	8 7	4517	14 10	0 5	0	320	150	24	1463
	19880	17 2	23063	5 2	67517	16 9			6540	747	178	11556

SECT. XI.—POPULATION.

MR Hutchinson, in his History of the County, in order to ascertain the number of inhabitants, procured the baptisms, marriages, and burials, of most of the parishes*, from the registers, for two periods of twenty years each, viz : between the years 1660 and 1680, and between 1760 and 1780. The mode he adopted to estimate the population was, by multiplying the number of burials in 1780, by 30, on the supposition that one-thirtieth of the inhabitants died yearly†. Calculations made from the deaths of any *single year*, may lead to very uncertain conclusions. The average deaths of ten years would have been much more accurate, as the burials in an isolated year may be much more, or much less, than the average of five or ten years; but as it exhibits the state of population of several parishes, at those two periods, I have collected and arranged them as follows.

* Mr Hutchinson complains that some of the clergy would not oblige him with extracts from their registers: a few of those he wanted, I have obtained; but could not succeed in procuring the whole.

† This gave the population much too low: it should have been 44, as will appear farther on.

An account of the number of Baptisms, Marriages, and Burials, of various parishes in the county of Durham, for two periods of twenty years each, viz : from 1660 to 1680, and from 1760 to 1780.

<i>Districts.</i>	<i>From 1660 To 1680.</i>			<i>From 1760 To 1780.</i>		
	<i>Bap.</i>	<i>Mar.</i>	<i>Bur.</i>	<i>Bap.</i>	<i>Mar.</i>	<i>Bur.</i>
<i>Chester Ward.</i>						
Boldon	298	53	215	221	64	243
Chester-le-Street	1729	133	375	4169	1010	3552
Ebchester				160	29	48
Edmondbyers and Muggleswick }				245	59	157
Gateshead	3310	647	3379	3633	1224	4675
Jarrow	345	90	111	1177	730	1140
Lamesley				1541	344	1147
Lanchester	493	140	498	1442	418	1027
Medomsley						
Monkwearmouth	508	73	322	2162	689	2134
Ryton	1560	195	576	2755	782	2577
South Shields	1965	104	1793	4449	922	3565
Tanfield				1822	403	1336
Washington	330	83	280	956	213	822
Whitburn						
Witton Gilbert	231	69	193	223	57	264
Whickham				2851	579	2785

<i>Districts.</i>	<i>From 1660 To 1680.</i>			<i>From 1760 To 1780.</i>		
	<i>Bap.</i>	<i>Mar.</i>	<i>Bur.</i>	<i>Bap.</i>	<i>Mar.</i>	<i>Bur.</i>
<i>Darlington Ward.</i>						
Auckland Bishop	1590	351	1335	1748	598	1606
Auckland St Helen's	599	136	385	1086	139	723
Ayklea	476	94	309	622	167	457
Barnardcastle	1092	200	1049	2131	547	1858
Brancepeth	720	161	550	877	261	634
Cockfield	90	43	75	396	78	258
Conslea	194	44	184	199	67	144
Darlington	949	165	880	2858	715	2621
Denton	59	12	37	202	28	96
Gainford	506	146	446	460	173	393
Hamsterley	425	106	367	575	176	275
Haughton-le-Skern	316	56	286	332	115	239
Heighington	486	117	384	628	147	447
Merrington	446	89	289	690	142	429
Middleton	541	119	362	1133	242	693
Staindrop	657	142	650	1052	225	786
Stanhope	637	198	764	2265	583	1469
Wolsingham	817	93	518	851	247	600
Witton-le-Wear	338	66	271	302	57	178
Winston	175	27	114	139	47	93
Whitworth	77	13	29	76	19	74
<i>Easington Ward.</i>						
Durham city	2617	596	2838	3293	1187	4707
Dalton-le Dale	134	28	96	102	44	59
Easington	515	109	420	518	129	449
Hesledon	245	49	213	233	72	217
Houghton-le-Spring	1429	238	1161	1804	572	1518
Kelloe	128	19	76	94	40	23
Pittington	281	92	212	281	100	327
Seaham	124	64	104	80	22	84
Wearmouth Bishop and Sunderland }	2613	453	1930	8017	3012	9433

<i>Districts.</i>	<i>From 1660 To 1680.</i>			<i>From 1760 To 1780.</i>		
	<i>Bap.</i>	<i>Mar.</i>	<i>Bur.</i>	<i>Bap.</i>	<i>Mar.</i>	<i>Bur.</i>
<i>Stockton Ward.</i>						
Billingham	533	183	375	482	177	487
Bishopton	205	38	116	247	87	187
Dinsdale			20			20
Eglescliff	267	52	225	240	72	197
Elton	47	8	36	60	12	59
Elwick				76	29	65
Greatham	236	72	296	277	76	374
Grindon	132	50	93	147	56	104
Hart	339	122	283	281	106	208
Hartlepool	316	91	325	548	139	501
Hurworth	280	60	301	379	123	240
Middleham	268	68	177	388	99	293
Middleton St George	168	34	102	131	44	84
Newton Long	174	45	140	182	80	149
Norton	361	101	401	465	121	481
Redmarshall	141	29	107	167	46	135
Sedgefield	706	158	578	864	230	763
Stockton	1236	229	873	1915	610	2000
Sockburn			1915			20
Stainton	100	10	64	64	18	43
Stranton	460		400	245		300

By the above it appears, that the great increase of inhabitants is in the commercial, manufacturing, and mining districts, and those parishes purely agricultural, where inclosures of commons, and improved cultivation have taken place; but in those unconnected with such circumstances, the population has been nearly stationary, and in a few instances has diminished; most probably owing to a part of the arable lands having been laid to permanent grass.

In the year 1800, an act of Parliament was passed for taking an "*account of the population of Great Britain, and the increase or diminution thereof.*" From the returns made in consequence of this act, I have extracted the

following statement of the population, and the baptisms, burials, and marriages, for every tenth year from 1700 to 1800, collected from the whole of the registers.

An account of the population of the County of DURHAM, taken by actual enumeration in March, 1801, by order of Parliament.

Chester Ward.

Districts.		Houses.		Persons.		Total of persons.	
		Inhabited.	Families in each.	Males.	Females.		
<i>East Division.</i>							
Barmston	*T	6	7	27	22	49	
Bedlington	T	142	179	371	418	789	
Boldon	P	122	129	302	317	619	
Cambois & Blyth	T	53	72	108	159	267	
Choppington	T	29	29	64	64	128	
Fulwell	T	12	14	40	45	85	
Gateshead	P	1037	2099	3974	4623	8597	
Harton	T	36	37	74	86	160	
Heworth	C	673	673	1375	1512	2887	
Hilton	T	40	62	162	150	312	
Jarrow, Monkton, & Hedworth	}	306	306	811	755	1566	
Monkwearmouth		T	175	268	485	618	1103
Ditto Shore	T	422	1060	1998	2241	4239	
Netherton	T	17	18	49	49	98	
South Shields	T	1260	2225	3274	4834	8108	
Sleekburn East and West	}	T	23	26	72	68	140
Southwick			47	108	270	284	554
Usworth & Biddick	T	259	268	632	604	1236	
Washington	T	238	242	630	560	1190	
Westoe	T	323	773	1178	1725	2903	
Whitburn	T	136	160	309	366	675	
Uninhabited houses	153	5356	8755	16205	19500	35705	

* T represents township; P parish; C chapelry; EP extra-parochial.

Chester Ward.

<i>Districts.</i>	<i>Houses.</i>		<i>Persons.</i>		<i>Total of persons.</i>
	<i>Inha- bited.</i>	<i>Fami- lies in each.</i>	<i>Males.</i>	<i>Females.</i>	
<i>Middle Division.</i>					
Beamish	T 317	347	794	780	1574
Birtley	T 208	223	517	509	1026
Broom	T 23	24	53	65	118
Chester-le-Street	T 248	405	794	868	1662
Edmondsley	T 37	77	243	196	439
Harraton	T 337	351	801	806	1607
Hedley	T 11	11	27	27	54
Kibblesworth	T 43	43	107	95	202
Lamesley	T 398	406	841	864	1705
Lintz Green	T 138	148	350	304	654
Ouston	T 9	10	25	23	48
Pelton	T 108	117	261	278	539
Plawsworth	T 41	43	86	91	177
Ravensworth	T 34	34	84	76	160
Urpeth	T 153	153	270	254	524
Walridge	T 20	20	40	43	83
Uninhabited houses	136	2115	2412	5293	5279
					10572

Chester Ward.

District.		Houses.		Persons.		Total of persons.	
		Inha- bited.	Fami- lies in each.	Males.	Females.		
<i>West Division.</i>							
Esh	C	68	74	127	149	276	
Billingside	T	2	8	29	25	54	
Burnop & Hamsteels	T	12	12	92	36	68	
Chopwell	T	73	75	174	172	346	
Collierley & Pontop	H	115	123	265	274	539	
Crawcrook	T	65	72	164	161	325	
Ebchester	T	38	44	80	88	168	
Edmondbyers	P	40	43	111	104	215	
Greencroft	T	32	42	89	95	184	
Helefield	T	30	30	73	72	145	
Holmside	H	41	42	93	86	179	
Hunstonworth	P	42	42	110	105	215	
Iveston	T	27	50	139	112	251	
Kimblesworth	T	3	3	12	10	22	
Kyo	T	50	50	137	144	281	
Lanchester	T	134	147	294	341	635	
Lanchester	H	11	11	36	37	73	
Langley	T	13	15	41	42	83	
Medomsley	P	137	165	372	382	754	
Muggleswick	C	42	45	95	106	201	
Ryton	T	84	103	191	241	432	
Ditto Woodside	T	159	189	444	441	885	
Satley	C	17	17	33	45	78	
Stella	T	79	87	138	176	314	
Whickham	P	615	863	1739	1920	3659	
Winlaton	T	568	680	1539	1482	3021	
Witton Gilbert	P	68	88	177	182	359	
Uninhabited houses		147	2565	3120	6734	7028	13762

Darlington Ward.

<i>Districts.</i>		<i>Houses.</i>		<i>Persons.</i>		<i>Total of persons.</i>
		<i>Inha- bited.</i>	<i>Fami- lies.</i>	<i>Males.</i>	<i>Females.</i>	
<i>South East Division.</i>						
Aycliffe Great	T	101	144	312	328	640
Archdeacon Newton	T	11	13	40	32	72
Barmpton	T	22	24	65	61	126
Blackwell	T	54	66	114	163	277
Brafferton	T	38	44	108	109	217
Burdon	T	14	19	34	44	78
Byers Green	T	26	26	38	39	77
Chilton Great	T	39	39	100	76	176
Coatsaw Moor	T	2	2	4	5	9
Cockerton	T	88	88	164	166	330
Coniscliff High	T	54	54	99	121	220
Ditto Low	T	22	30	68	68	131
Counden Grange	T	4	4	10	15	25
Darlington	T	864	1111	2158	2512	4670
Denton	T	33	36	65	76	141
Eldon	T	23	23	46	55	101
Ferry Hill	T	121	123	236	271	507
Haughton	T	65	75	140	168	308
Heighington	T	136	147	274	269	543
Hett	T	35	39	82	75	157
Houghton-le-Side	T	25	23	46	56	102
Killarby	T	18	18	28	38	66
Merrington	T	55	59	112	116	228
Middleton	T	17	17	37	41	78
Midridge	T	48	48	99	99	198
Ditto Grange	T	8	8	23	18	41
Old Park	T	2	2	8	12	20
Preston-le-Skern	T	23	23	57	62	119
Redworth	T	69	69	157	165	322
School Aycliff	T	7	7	20	21	41
Sunderland Bridge	T	41	48	133	117	250
Tudhoe	T	40	41	126	93	219
Westerton	T	13	14	27	29	56
Walworth	T	23	23	69	68	137
Whessoe & Beaumont Hill	}	14	16	42	35	77
Windleston		T	36	36	87	109
Woodham	T	33	33	92	74	166
Uninhabited houses	97	2224	2592	5310	5806	11116

Darlington Ward.

Districts.	Houses.		Persons.		Total of persons.		
	Inha- bited.	Fami- lies.	Males.	Females.			
South West Division.							
Barnardcastle	T	304	729	1334	1632	2966	
Bolam	T	23	24	41	52	93	
Cleatlam	T	15	15	37	36	73	
Cockfield	T	101	110	210	251	461	
Eggleston	T	63	68	149	157	306	
Gainford	T	97	108	202	243	445	
Headlam	T	20	20	43	46	89	
Hilton	T	18	18	42	46	88	
Ingleton	T	63	63	124	112	236	
Langley-Dale and Shotton	}	T	23	25	73	70	143
Langton		T	15	15	39	39	78
Marwood	T	21	22	86	70	156	
Middleton	T	139	161	389	407	796	
Merton	T	5	5	10	13	23	
Newbiggin	T	31	38	140	141	281	
Pierce Bridge	T	44	46	92	101	193	
Raby	T	35	37	107	106	213	
Staindrop	T	177	276	535	621	1156	
Stainton & Streatlam	T	50	50	137	135	272	
Summer House	T	35	35	76	82	158	
Teesdale Forest	T	88	97	239	221	460	
Wacherfield	T	22	22	44	50	94	
Westwick	T	13	21	50	43	93	
Whorlton	T	50	52	120	125	245	
Winston	T	59	65	163	144	307	
Woodland	T	16	16	38	40	78	
Uninhabited houses	60	1527	2138	4520	4983	9503	

Darlington Ward.

Districts.	Houses.		Persons.		Total of persons.		
	Inha- bited.	Fami- lies.	Males.	Females.			
North West Division.							
Auckland St Andrew	T	24	28	53	68	121	
Ditto Bishop	T	408	507	878	1083	1961	
Ditto St Helen	T	41	41	86	129	206	
Ditto West	T	238	238	433	545	978	
Bedburn North	T	51	64	111	134	245	
Ditto South	T	51	63	161	149	310	
Binchester	T	6	6	21	21	42	
Brancepeth	T	70	82	177	190	367	
Brandon & Byshottles	T	104	111	273	249	522	
Cornsey	T	43	59	113	121	234	
Coundon	T	33	33	74	89	163	
Crook & Billyrow	T	32	32	99	94	193	
Escomb	T	46	49	74	88	162	
Evenwood & Barony	T	173	176	358	411	769	
Hamsterley	T	95	127	231	260	491	
Hedleyhope	T	5	8	23	24	47	
Helmington Row	T	27	28	60	61	121	
Hunwick & Hel- mington	}	T	28	29	61	61	122
Lynesack & Softley		T	107	110	260	257	517
Newfield	T	2	2	5	6	11	
Newlandside	T	100	109	298	306	604	
Newtoncap	T	27	27	53	61	114	
Pollards Lands	T	17	17	42	40	82	
Shildon	T	24	30	43	58	101	
Stanhope	T	188	245	592	647	1239	
Ditto Forest Qr.	T	374	407	1155	988	2143	
Ditto Park Qr.	T	131	211	614	555	1169	
Stockley	T	16	16	41	48	89	
Thickley East	T	2	2	7	6	13	
Whitworth	P	19	27	54	58	112	
Willington	T	35	38	80	89	169	
Witton-le-Wear	T	74	78	256	194	450	
Wolsingham	P	388	436	862	972	1834	
Uninhabited houses	119	2979	3436	7648	8053	15701	

Easington Ward.

Districts.	Houses.		Persons.		Total of persons.
	Inhabited.	Families.	Males.	Females.	
North Division.					
Biddick Waterville	T 111	119	234	256	490
Bishopwearmouth	T 844	1603	2706	3420	6126
Ditto Pans	T 56	138	279	285	564
Burdon	T 17	17	85	34	69
Burn Moor	T 174	174	471	418	889
Cocken	T 4	4	10	7	17
Cold Hesledon	T 7	7	23	25	48
Dalton-le-Dale	T 10	10	18	22	40
Dawdon	T 2	2	15	7	22
Eppleton Great	T 9	9	19	16	35
Ditto Little	T 1	1	4	2	6
Ford High	T 74	145	320	282	602
Herrington East & Middle	T 28	31	57	66	123
Ditto West	T 47	47	97	112	209
Hetton le-Hole	T 43	49	106	106	212
Houghton-le-Spring	T 155	225	484	512	996
Lumley Great	T 155	166	336	360	696
Ditto Little	T 48	48	130	119	249
Lambton	T 59	59	133	133	266
Moor Houses	T 4	4	11	12	23
Moorsley	T 7	8	18	18	36
Murton East	T 16	16	43	32	75
Ditto Grange	T 33	33	93	95	188
Newbottle	T 194	208	480	490	970
Offerton	T 32	32	37	40	77
Painshaw	T 267	267	735	664	1399
Rainton East	T 61	66	148	146	294
Ditto West	T 110	112	222	213	435
Ryhope	T 55	58	128	126	254
Seaham	T 17	21	57	58	115
Seaton & Slingsley	T 19	24	47	49	96
Silksworth	T 23	24	79	59	138
Tunstall	T 8	8	24	29	53
Wardenlaw	T 2	2	9	6	15
Uninhabited houses	105	2692	3737	7608	8219
					15827

Easington Ward.

Districts.		Houses.		Persons.		Total of persons.	
		Inha- bited.	Fami- lies.	Males.	Females.		
South Division.							
Cassop	T	11	12	31	22	53	
Castle Eden	P	60	74	188	174	362	
Coxhoe	T	27	27	56	61	117	
Easington	T	99	117	235	252	487	
Haswell	T	14	14	51	42	93	
Hawthorn	T	27	29	55	59	114	
Hesledon Monk	T	34	36	77	73	150	
Hulam	T	2	2	3	4	7	
Hutton Henry	T	35	35	85	71	156	
Kellow & do Church	T	18	18	45	35	80	
Nesbitt	T	1	1	3	2	5	
Pittington	T	40	102	102	118	220	
Quarrington	T	23	23	61	51	112	
Shadforth	T	47	50	91	93	184	
Sheraton	T	25	25	48	51	99	
Sherburn	T	59	70	119	133	252	
Ditto House	L	13	13	47	33	80	
Shincliff	T	54	64	114	130	244	
Shotton	T	52	55	128	122	250	
Thornley	T	9	9	25	31	56	
Thorp Bulmer	T	3	3	13	11	24	
Trimdon	T	66	72	133	145	278	
Whitwell House	EP	4	4	14	13	27	
Wingate	T	24	24	71	64	135	
Uninhabited houses		61	747	879	1795	1790	3585

Stockton Ward.

Districts.		Houses.		Persons.		Total of persons.
		Inhabited.	Families.	Males.	Females.	
North East Division.						
Billingham	T	74	82	148	187	335
Bradbury	T	24	24	50	56	106
Brearton	T	3	3	12	10	22
Butterwick	T	9	9	31	29	60
Claxton	T	7	7	19	23	42
Cornforth	T	74	74	145	179	324
Coopen Bewley	T	30	33	59	69	128
Dalton Piercy	T	16	16	36	34	70
Elstob	T	7	7	14	23	37
Elwick	T	50	50	76	94	170
Ditto Hall	P	22	22	70	59	129
Embleton	T	18	19	49	49	98
Fishburn	T	37	39	71	83	154
Foxton & Shotton	T	9	9	32	21	53
Garmondsway Moor	T	5	5	17	11	28
Greatham	T	90	112	207	235	442
Grindon & Thorp } Thewles }	T	48	59	171	154	325
Hart	T	47	47	103	116	219
Hartlepool	T	226	246	437	556	993
Mainsforth	T	10	10	24	31	55
Middleham Bishop	T	74	86	156	175	331
Mordon	T	29	29	42	59	101
Seaton Carew	T	65	65	122	141	263
Sedgefield	T	301	283	571	613	1184
Stainton Great	T	17	20	58	46	104
Stillington	T	8	8	41	28	69
Stranton	T	74	74	171	154	325
Throston	T	9	9	31	27	58
Wolviston	T	89	104	195	216	411
Uninhabited houses	67	1472	1551	3158	3478	6636

Stockton Ward.

District.	Houses.		Persons.		Total of persons.		
	Inha- bited.	Fami- lies.	Males.	Females.			
South West Division.							
Aislaby	T	26	26	59	57	116	
Bishopton	T	89	89	162	187	349	
Carleton	T	27	27	48	51	99	
Coatham Mundeville	T	21	25	76	96	172	
Dinsdale	T	16	23	49	59	108	
Egglescliff	T	66	68	118	152	270	
Elton	T	18	18	38	40	78	
Hartburn East	T	31	32	48	56	104	
Hurworth	T	147	151	330	331	661	
Middleton St George	T	45	50	106	109	215	
Neasham	T	40	46	110	96	206	
Newbiggins East and West	}	T	7	7	19	23	42
Newsham		T	6	6	17	17	34
Newton Bewley	T	20	20	42	46	88	
Newton Long	T	53	53	157	138	295	
Norton	T	240	245	410	355	965	
Preston upon Tees	T	11	11	31	33	64	
Redmarshall	T	9	13	27	33	60	
Sadberge	T	80	87	186	205	391	
Sockburn	T			16	18	34	
Stainton Little	T	18	18	25	34	59	
Stockton	T	527	943	1795	2214	4009	
Whitton	T	11	11	21	17	38	
Uninhabited houses	48	1508	1969	3890	4567	8457	

Islandshire.

Districts.		Houses.		Persons.		Total of persons.
		Inhabited.	Families.	Males.	Females.	
<i>Islandshire.</i>						
Ancroft	P	227	229	507	637	1144
Holy Island	P	136	148	274	327	601
Kyloe	P	198	199	426	542	968
Tweedmouth	P	386	933	1560	1898	3458
Uninhabited houses	90	947	1509	2767	3404	6171
<i>Norhamshire.</i>						
Cornhill	P	140	144	321	347	668
Duddo	T	44	44	112	119	231
Felkington	T	36	38	91	103	194
Grindon	T	28	29	88	102	190
Horncliff	T	69	74	165	177	342
Loan End	T	27	27	65	69	134
Longridge	T	13	13	30	36	66
Norham	T	156	184	355	373	728
Ditto Mains	T	16	16	45	43	88
Shoreswood	T	48	48	109	138	247
Thornton	T	38	38	100	112	212
Twizell	T	52	54	140	144	284
Uninhabited houses	44	667	709	1621	1763	3384

City of Durham.

		Houses.		Persons.		Total of persons.	
		Inha- bited.	Fami- lies.	Males.	Females.		
<i>Durham City.</i>							
College	EP	16	16	36	70	106	
Crossgate	T	149	361	515	686	1201	
Elvet Barony		155	340	539	674	1213	
Elvet Borough		140	180	264	350	614	
Framwellgate	T	131	246	485	586	1071	
St Giles	P	119	249	448	492	940	
St Mary-le-Bow, in- cluding the Goal	}	P	62	83	207	270	477
St Mary Little		P	16	16	79	75	154
St Nicholas		P	236	439	746	1008	1754
Uninhabited houses	30	1024	1930	3319	4211	7530	
Sunderland Town		1365	3372	4902	7510	12412*	
Uninhabited houses	14						

* In the town of Sunderland there are 1249 seamen, and 322 keel-men, not included in the above.

Summary of the whole County.

<i>Districts.</i>	<i>Houses.</i>			<i>Persons.</i>		<i>Total of persons.</i>
	<i>Uninhabited.</i>	<i>Inhabited.</i>	<i>Families</i>	<i>Males.</i>	<i>Females.</i>	
Chester Ward	436	10036	14287	28232	31807	60039
Darlington ditto	276	6730	8166	17478	18842	36320
Easington ditto	166	5439	4616	9403	10009	19412
Stockton ditto	115	2980	3520	7048	8045	15093
Durham City	30	1024	1930	3819	4211	7530
Sunderland Town	14	1365	3372	4902	7510	12412
Islandshire	90	947	1509	2767	3404	6171
Norhamshire	44	667	709	1621	1763	3384
Total of resident inhabitants	1171*	27188	38109	74770	85591	160361
To which add 1-30th for soldiers and sailors						5345
Total of existing population						165706

The second object of the population act, was to ascertain the *increase or diminution* of the population throughout the last century : to effect this, certain questions were sent to the officiating ministers of every church and chapel in the kingdom. The result of their answers for the county of Durham is given in the following tables.

* In this number are included all such new houses as were not so far completed as to have received inhabitants.

Abstract of the Returns to Parliament in 1801, of the Baptisms, Burials, and Marriages, in the County of Durham, from 1700 to 1800.

Chester Ward.

Year.	Baptisms.			Burials.			Marriages.
	Males.	Females.	Total.	Males.	Females.	Total.	Averages of 10 years.
1700	538	439	977	455	437	892	
1710	484	480	964	435	474	909	
1720	629	574	1203	437	449	886	
1730	580	543	1123	566	562	1128	
1740	657	628	1285	597	554	1151	
1750	733	632	1365	533	410	943	
1760	718	690	1408	615	620	1235	350*
1770	798	722	1520	663	660	1323	416
1780	842	770	1612	683	720	1403	404
1790	862	815	1677	721	708	1429	503
1800	898	843	1741	823	836	1659	544

The above abstract is collected from the registers of Bedlington, Birtley, Boldon, Chester-le-Street, Ebchester, Edmondbyers with Muggleswick, Esh, Gateshead, Hunstonworth, Jarrow, Kyloe, Lamesley, Lanchester, Medomsley, Monkwearmouth, Ryton, Satley, Shields South, Tanfield, Washington, Whitburn, Witton Gilbert, and Whickham.

* The registers of marriages were found very defective until the year 1754, when the marriage act was passed: since which time the registers of marriages are probably the most perfect of any other, owing to the regulations of that act.

Darlington Ward.

<i>Years.</i>	<i>Baptisms.</i>			<i>Burials.</i>			<i>Marriages.</i>
	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Averages of 10 years.</i>
1700	303	294	597	292	271	597	
1710	260	256	516	267	252	519	
1720	367	366	733	259	271	531	
1730	339	355	694	366	339	705	
1740	391	377	768	242	275	517	
1750	464	401	865	301	274	575	
1760	439	418	857	289	303	592	202
1770	548	511	1059	389	361	750	254
1780	538	486	1024	276	330	606	248
1790	542	524	1066	340	431	771	263
1800	482	467	949	379	401	780	268

The above abstract is collected from the registers of Auckland Bishop, Auckland St. Helen, Aycliffe Great, Barnardcastle, Brancepeth, Cockfield, Coniscliffe, Darlington, Denton, Escomb, Gainford, Hamsterley, Haughton-le-Skern, Heighington, Merrington, Middleton, Staindrop, Stanhope, Whitworth, Whorlton, Witton-le-Wear, Winston, and Wolsingham.

Easington Ward.

<i>Years.</i>	<i>Baptisms.</i>			<i>Burials.</i>			<i>Marriages.</i> <i>Averages of 10 years.</i>
	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	
1700	194	112	246	93	76	169	
1710	219	168	387	227	176	403	
1720	187	197	384	136	137	273	
1730	209	176	385	222	208	430	
1740	226	193	419	158	198	356	
1750	196	174	370	169	149	318	
1760	133	166	299	140	134	274	96
1770	152	152	304	176	166	342	118
1780	193	186	379	177	198	375	113
1790	196	179	375	131	158	289	123
1800	243	246	489	183	182	365	166

The above abstract is collected from the registers of South Bailey, Castle Eden, Croxdale, Dalton-le-Dale, Easington, Monk Hesledon, Houghton-le-Spring, Kelloe, Painshaw, Pitlington, Seaham, Sherburn House, Trimdon, and Wearmouth Bishop.

Stockton Ward.

<i>Years.</i>	<i>Baptisms.</i>			<i>Burials.</i>			<i>Marriages.</i> <i>Averages of</i> <i>10 years.</i>
	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	
1700	178	164	342	125	119	244	
1710	178	148	326	88	155	243	
1720	208	177	385	160	182	342	
1730	169	179	348	199	228	427	
1740	190	176	366	180	189	369	
1750	183	184	367	164	118	282	
1760	183	162	345	138	153	291	100
1770	191	176	367	139	165	304	123
1780	190	194	384	162	198	360	113
1790	211	208	419	145	167	312	116
1800	182	205	387	113	132	245	106

The above abstract is collected from the registers of Billingham, Bishopston, Carleton, Craike, Dinsdale, Egglecliffe, Elton, Elwick Hall, Greatham, Grindon, Hart, Hartlepool, Hurworth, Middleham, Middleham St. George, Newton Long, Norton, Redmarshall, Sadberge, Sedgfield, Stillington, Stockton, Sockburn, Staynton, Stranton, and Wolviston.

Norhamshire.

Years.	Baptisms.			Burials.			Marriages.
	Males.	Females.	Total.	Males.	Females.	Total.	Averages of 10 years.
1700	26	28	54	36	28	64	
1710	22	24	46	14	21	35	
1720	20	24	44	32	37	69	
1730	23	16	39	25	24	49	
1740	22	15	37	19	33	52	
1750	15	13	28	26	23	49	
1760	8	9	17	27	25	52	17
1770	12	7	19	23	31	54	15
1780	15	10	25	27	27	54	11
1790	13	9	22	13	29	42	10
1800	11	7	18	25	33	58	4*

The above abstract is collected from the registers of Cornhill and of Norham.

* The reason of the great decline in the number of registered marriages, both in this district and in Islandshire, is the facility of having the ceremony performed in Scotland, either at Coldstream or Lamber-ton Toll Bar, for a trifling expence, and without waiting the tedious time of publishing banns. It not only affects these districts, but several other parishes in the northern parts of Northumberland.

Islandshire.

<i>Years.</i>	<i>Baptisms.</i>			<i>Burials.</i>			<i>Marriages.</i>
	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Averages of 10 years.</i>
1700	42	35	77	39	21	60	
1710	47	54	101	50	57	107	
1720	58	58	116	50	37	87	
1730	51	42	93	46	27	73	
1740	50	44	94	46	33	79	
1750	45	36	81	73	44	117	
1760	18	27	45	39	38	77	23
1770	30	19	49	51	47	98	18
1780	27	22	49	71	61	132	13
1790	25	25	50	38	67	105	7
1800	30	19	49	60	69	129	8

The above abstract is collected from the registers of An-croft, Holy Island, and Tweedmouth.

City of Durham.

Years.	Baptisms.			Burials.			Marriages.
	Males.	Females.	Total.	Males.	Females.	Total.	Averages of 10 years.
1700	89	80	169	120	103	223	
1710	67	82	149	75	84	159	
1720	71	83	154	89	76	165	
1730	83	96	179	127	126	253	
1740	77	90	167	99	111	210	
1750	99	80	179	102	82	184	
1760	72	71	143	93	95	188	45
1770	78	81	159	78	89	167	52
1780	95	94	189	90	89	179	57
1790	111	84	195	8	98	183	61
1800	101	96	197	122	138	260	82

The above abstract is collected from the registers of Durham College, St. Giles, St. Margaret, St. Mary-le-Bow, St. Nicholas, and St. Oswald, all in the city of Durham.

Town of Sunderland.

<i>Years.</i>	<i>Baptisms.</i>			<i>Burials.</i>			<i>Marriages.</i>
	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Averages of 10 years.</i>
1700							
1710							
1720	91	87	178	63	59	122	
1730	95	98	193	114	121	235	
1740	120	118	238	110	109	219	
1750	110	135	245	151	115	266	
1760	149	122	271	151	162	313	82
1770	113	154	267	204	236	440	114
1780	157	141	298	216	206	422	113
1790	154	186	340	189	205	394	123
1800	137	156	293	212	233	445	129

The above abstract is collected from the register of the town of Sunderland.

Summary of the whole County.

<i>Years.</i>	<i>Baptisms.</i>			<i>Burials.</i>			<i>Marriages.</i> <i>Averages of</i> <i>10 years.</i>
	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	
1700	1310	1152	2462	1160	1055	2215	
1710	1277	1212	2489	1252	1219	2471	
1720	1631	1566	3197	1226	1249	2475	
1730	1549	1505	3054	1667	1633	3300	
1740	1733	1641	3374	1451	1502	2953	
1750	1845	1655	3500	1519	1215	2734	
1760	1720	1695	3415	1492	1530	3022	917
1770	1922	1822	3744	1722	1755	3477	1111
1780	2057	1803	3860	1702	1829	3531	1072
1790	2114	2030	4144	1662	1863	3525	1208
1796	2140	2045	4185	2037	2080	4117	1369
1797	2056	2132	4188	1657	1777	3434	1445
1798	2325	2200	4525	1660	1753	3413	1413
1799	2108	2135	4243	1954	1948	3902	1439
1800	2084	2139	4223	1917	2024	3941	1230
Averages of the } last 5 years			4273		3761	1379	

From the above summary it appears that the number of baptisms has increased from 2462 to 4273, in a period of 100 years; and that the marriages have increased from 917 to 1379, in a period of 50 years, both of which indicate a considerable increase of population.

The average number of baptisms from 1793 to 1800, (by the returns to Parliament,) being 4273, and the existing population in the latter year being 165700: from these data may be calculated the population of any other year, having given the number of baptisms for that year, or the average of the five preceding years: thus—suppose the population for 1700 were required, the number of baptisms in that year being 2462, Then,—

As the average baptisms from 1795 to 1800 =	4273
Are to the population of 1800 =	165700
So are the baptisms in 1700 =	2462
To the population of 1700 =	95472

And by comparing the number of inhabitants of the years 1700 and 1800, it will be found that the population has increased in this period of 100 years, in the ratio of 57 to 100.

The population in 1800 being 165700, and the average of baptisms from 1795 to 1800 being 4273, the ratio of inhabitants to one baptism yearly, will be nearly as 39 to 1: hence, if the number of baptisms in any average of years be multiplied by 39, the product will be the number of inhabitants nearly.

The population being 165700, and the marriages on an average of five years previous to 1800, being 1379, the population will be to the annual marriages as 120 to 1.

The yearly baptisms being 1-39th of the population, and the marriages 1-120th, the yearly baptisms are to those of marriages as 9 to 1 nearly.

The burials upon an average of five years being 3761, the population will be to the burials in the ratio of 44 to 1—hence the average number of burials of five or ten years multiplied by 44, will give the population. But it may be proper to remark, that the burials are a much more uncertain datum for calculating the population, than either baptisms or marriages, as they are frequently affected by epidemical diseases and unhealthy seasons.

The average baptisms being 4273, and the burials 3761, the difference 512, or about 1-324th of the population leave the country, and die abroad yearly.

The average number of baptisms between 1786 and 1790, being 4033, and the average between 1796 and 1800, being 4273—then

$$\text{As } 4033 : 4273 :: 100 : 106$$

Hence the ratio of the increase of population is as 100 to 106, and supposing the rate of increase for the next ten years to continue the same, we have

$$100 : 106 :: 165700 : 175642$$

The population in the year 1810, which is an increase of nearly 10,000 in the last ten years, or 1,000 per year.

This increased population has not depended on the "*facility of raising cottages*," (for that is not the case here) but has been owing to the increased commerce, manufactures, and improved agriculture; and the wages hav-

ing increased in a greater ratio than the price of provisions.

This county, it is presumed, is "under peopled," as corn, pork, hams, butter, cheese, &c. are exported, and cattle and sheep driven to the southward, and to Wakefield and Skipton markets, for the supply of the manufacturing districts of Yorkshire and Lancashire. It is in general very healthy, except a tract of flat country towards the Tees Mouth, which is subject to agues.

The food and mode of living of the labouring classes are very simple : the bread generally used is made of maslin, leavened, and baked in loaves, called brown bread : the most usual breakfast is bread and milk, and in winter, when the latter is scarce, hasty pudding or crowdy is substituted for it : for dinner, pudding, or dumpling, and potatoes, with a small portion of animal food, or bread and cheese, with milk, and very often bread and milk only : for supper, bread and milk, or potatoes and milk, and when the latter is scarce, treacle beer is used in its stead.

The extravagant and wasteful custom, so destructive to the morals of the labouring classes, and so common in the southern counties, of giving beer and ale three, four, or five times a day, is not practised here ; and I hope for the good of society, and the domestic comforts of the labourer's family, it will never find its way into this district.

CHAP. XVII.

OBSTACLES TO IMPROVEMENT.

SECT. I.

RELATIVE TO CAPITAL, AND WANT OF LEASES.

IN a district where there is such a number of small farms, the tenants are generally poor, and have no more capital than what is necessary to carry on the usual routine of their business, and when the rent is to pay, find great difficulty in raising it: of course they have little or no extra capital to risque in improvements; but if by a fortunate year a tenant should have a small sum to spare, and knew that by laying this out in draining, or in purchasing manure, it would improve his farm so much as to repay him double the money in a few years, yet he is deterred from doing this by recollecting that his term will be expired before he can be repaid the money he has disbursed, and he very prudently applies his small savings to some other purpose; and this will always be the case so long as the present system of letting no leases, continues, or leases of such short endurance as they are generally here.

SECTS. II. AND III.—PRICES AND EXPENCES.

In respect to prices and expences, they do not seem to operate as obstacles to improvement in this county.

SECT. IV.—WANT OF POWER TO ENCLOSE.

THE want of power to enclose, without being at the expence of six or seven hundred pounds for obtaining an act of Parliament, is a great obstacle to the improvement of commons by enclosure, and is a total bar to those of a small size. This great expence of obtaining acts of Parliament operates very much against the improvement of a country, not only in the enclosing of commons, but by checking turnpike roads, in which case the evil is increased by having the act to renew every 21 years, at an expence of five or six hundred pounds. The benefits to the public of having good roads are generally admitted—then why not put them on the same footing as canals and other public improvements?

SECT. V.—TITHES.

TITHES, of all other things, are the greatest obstacle

to improvements, as no one will attempt to improve bad lands, under a certainty of having one-tenth of his capital and labour taken from him, as it is these, and these only, that can make barren land so productive as to grow profitable crops of grain; and these profits, it is very probable, do not amount to more than one-tenth of the produce: but when this is taken away (by one who has been at no expence, and who never derived any advantage from these lands before) it leaves the spirited improver without any gains whatever, and he is left to brood over the mortifying prospect of seeing the tithe owner reap the benefits, of all his labour, capital, and extra industry.

SECT. VI.—RELATIVE TO POOR RATES AND PROPERTY
TAX.

THE poor rates in the agricultural districts of the this county are not high, and of course are no obstacle to improvements, which would rather lessen them by increasing the value of the land, and by giving employment to an additional number of labourers, but the *Property Tax* operates very strongly against improvements, and particularly that part of it which gives power of raising the rent after the first seven years of the lease, by which the tenant is obliged to pay both the landlord's tax and his own, or 17l. 10s. per cent. on the advanced rent, and also an increase of all parochial and parliamentary

taxes, which being paid by the pound rent, or annual value of his farm, will not be less than other 17*l.* 10*s.* per cent. making in all 35 per cent. on the advanced rent; therefore, instead of receiving 100*l.* which he had estimated would repay him, (before the expiration of his term,) for his capital expended, he will only receive 65*l.*; thus finding himself a loser, he wisely determines never to be guilty of the folly of making improvements under such circumstances in future.

But the principle of this tax, "*that the farmer's profits are two-thirds of his rent,*" is both absurd and unjust: absurd in supposing that all farms make the same returns of profit; and unjust in obliging the farmer's capital to pay a tax in a different manner from all other capitals employed in trade; as farming is nothing more than a trade, and a trade in which the profits are not always constant, and regularly three-fourths of his rent, but as irregular and uncertain as the profits of any other trade, and when taken in the aggregate, very rarely exceed 10 per cent. upon the capital employed, and upon many farms taken of late years, even less than 5 per cent., and though losing concerns, yet the occupiers are obliged to pay a tax on a supposed profit, which never existed but in the idea of some misinformed member of the legislature.

:

SECT. VIII.—ENEMIES.

Wire Worm, Slugs, Grubs, &c.

WHEN land is ploughed out from old grass, the crops

frequently fail for two or three years afterwards, by what is here called 'leaping' or dying off for large spaces together, scarcely a single plant remaining: this failure is attributed chiefly to the *wire worm*; but I am inclined to think, that part of this mischief is owing to slugs or grubs, of different species: one of them, of large size and brown colour, did much mischief in the spring of the year 1800.* There is also another, like a large white maggot, with a black head; and others, which at different times share in the destruction, as seasons and circumstances suit.

The best preventive for this effect of leaping, that is known in this district, is paring and burning: where this operation is well performed, there are few instances of crops being injured by leaping.

Rats and Mice.

These vermin are such destructive enemies to the farmer, that the yearly loss of grain is of considerable value; and the only remedy he has hitherto had, is to employ some rat-catcher, who generally destroys them by poison: this is not only exceedingly dangerous, but a very partial and temporary cure: a much safer and better mode is by taking them alive, which a rat-catcher I have employed for some years, does very effectually in the following manner: His traps are an oblong box 28 inches long, 12 inches broad, and 6 high, with a falling

* I gave a drawing of this and the parent fly (the tipula, or long-legged tailor) in the *Edinburgh Farmer's Magazine*, for October, 1800.

door at each end, (Fig. 6, plate v) : at the first setting of these traps the doors are tied up or turned back, so as to leave the box open at both ends : in this box scented oatmeal is laid for some days, upon which the rats come and feed, at first cautiously, but in a few days without any reserve or fear ; as soon as this is ascertained, the trap is set, by fixing the trigger T, in the catch of the piece of iron that comes from the kittle board K ; the trigger T is fixed to a string A, which communicates (through the holes at the top of the stand S) with two others, B and C, fixed to the falling doors DD : some scented oatmeal is then laid upon the kittle board K, and when the rat comes to feed as before, and presses on the edge of the kittle board, it turns down, (being round at the bottom) and disengages the trigger T, by which the strings A B and C are let loose, and the two doors DD immediately fall down and close in the vermin.

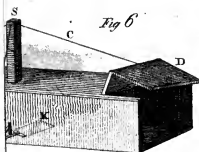
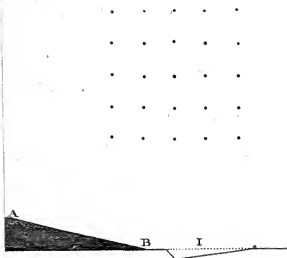
One principal reason why rats are so numerous is, that those people who take them, are supplied with colonies from their more saving neighbours, who grudge to be at any such expences.

If the taking of rats was made general, by a rate being equally laid upon every parish for that purpose, and a bargain made with some person to take them alive, and keep the parish clear for 14 or 15 years, at a certain stipulated sum, I have no doubt but that in a few years they would be so thinned, that a rat would be a rarity, and several thousand quarters of grain preserved yearly to the public.

A similar practice with respect to moles prevails in

PLATE V.

Fig 2



to face page 364



many parts of Cumberland, and the consequence is, a mole hill is scarcely ever seen.

Where sparrows are abundant, and of course prejudicial, every farmer has it in his power to reduce the number, by giving boys a small premium for each nest of eggs or young ones they bring him.

Crows in some places are very numerous, and wherever that is the case, the injury they do is incalculable, as they not only destroy wheat, barley, and oats, in the sprouting state, but also beans and potatoes, though not so favoured a food as the former; but one of these happens to be found at an early, and the other at a late season, when there is scarcely any food to be gotten: and where corn is drilled they are more particularly destructive, as they find the sprouting grain by following the row in which it is deposited, and being sown at an equal depth, they get at it with greater facility than when sown broadcast.

CHAP. XVIII.

MISCELLANEOUS ARTICLES.

Agricultural Societies.

THE first agricultural society established in the county, was at Darlington, on the 15th September, 1783, and it was denominated the Agricultural Society for the County of Durham.

The rules of this society were, that every subscriber of one guinea should be deemed a member of the society.

At the first institution there were 32 subscribers of two guineas each, and 23 of one guinea each, making the whole subscription 91l. 7s.

They have four general meetings: two at Durham, and two at Darlington.

No premium to be offered until it has been approved by a majority at a general meeting: and the premiums to be adjudged by a majority of the members at a general meeting.

The premiums offered in 1808, were—

Horses.

For the best stallion for road horses	3 guineas.
Ditto for draught horses	3 ditto.
For the best draught mare with foal	3 ditto.

Cattle.

For the best bull	3 ditto.
For the best cow or heifer	3 ditto.
For the best fat ox under 3 years old	20 ditto.
For the second best ditto ditto	5 ditto.

Sheep.

For the best penn of 5 fat wethers	10 ditto.
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Swine.

For the best pig not exceeding ten lunar months old	5 ditto.
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Servants.

To the male or female servant that has lived the greatest number of years in the same service.

To the labourer who has brought up the greatest number of children without parish relief.

Barnardcastle, Wolsingham, and Shiney-Row Societies.

In 1802, an agricultural society was begun at Barnardcastle; and in 1806, another at Wolsingham; and since that time one at Shiney-Row, near Chester-le-Street, with similar premiums to those of the county society, but the rewards smaller.

Tyne-Side Society.

There was also one established in 1805, by a number of gentlemen on both sides of the Tyne; and being limited to that district, was called the *Tyne-Side Society*. The premiums are similar to those above.

Besides these, Sir Henry Vane Tempest has for some years past given premiums for the best cattle and sheep, the produce of the county, to be exhibited at his annual sheep-shearing: he also gives several premiums to his tenants, for having the best stock, best cultivated farms, best crops, &c. &c.

At those meetings there are generally several sweepstakes entered into* for shewing the best cattle and sheep: the oxen to be shewn at three years old, and slaughtered to shew their comparative merits: the heifers are shewn at two years old, and not killed: the sheep mostly shearlings, which are also killed to shew their comparative merits.

* The subscriptions to those sweepstakes are from 1 to 5 guineas each subscriber.

Rusheyford, or Experimental Society.

In 1803, a few intelligent agriculturists suggested the plan of an experimental society, to consist of a limited number of members, (21,) for the purposes of trying various experiments upon their respective farms. The principal objects of which were—

“ 1st. To examine by experiments, the different kinds
“ and merits of grass, seeds, and grain; to investigate
“ their habits, and endeavour to ascertain what soils are
“ best adapted to each kind, and to devise means to ob-
“ tain such seeds, &c. pure.

“ 2nd. To attend carefully to the rearing of fences,
“ draining of land, and the best and most expeditious
“ way of cleaning and working different soils.

“ 3rd. To examine the nature of different manures,
“ and ascertain the best mode of applying them.

“ 4th. To find what stock is best calculated for cer-
“ tain situations, to compare the relative quantity of food
“ consumed by different kinds of stock, and what food
“ is most congenial, &c.”

This society for agricultural experiment agreed to meet four times a year at Rusheyford: a number of excellent rules were drawn up for their government, from which I select the following:

“ Each member shall pay one guinea into the hands
“ of the secretary, as a fund for the expences of the
“ society.

“ The expediency of any proposed experiment shall
“ be determined upon by the committee, previously to
“ its adoption by the society.

“ When any member undertakes an experiment
 “ adopted by the society, two members shall be appoint-
 “ ed as visitors, to view with him the state of the land
 “ previous to the experiment, inspect its progress, and
 “ report the result.

“ When any member undertakes an experiment
 “ adopted by the society, he shall pay the market price
 “ of the article : any extra charge to be defrayed from
 “ the general fund.

“ If similar societies shall be formed in other counties,
 “ this society shall express its desire of entering into a
 “ correspondence with them.

“ The society shall admit corresponding members.

“ No conversation on religion, or on general or local
 “ politics, shall be allowed at the meetings.”

Provincial Terms.

A

Adlings, earnings.

Amel, between.

Arder, fallow quarter.

Arles or *Earles*, earnest money.

Arnut, earth nut.

B

Bain, ready, near.

Batts, islands in rivers, or flat grounds adjoining
 them.

Beck, a brook or rivulet.

Berrier, a threshers.

Bink, a seat of stones, wood, or sods, made mostly against the front of a house.

Blash, to plash.

Bleb, a drop.

Braugham, a collar which goes round a horse's neck to draw by.

Brake, a large harrow.

Brent, steep.

Brissel, to scorch or dry very hard with fire.

Bumble-kites, bramble berries (fruit of *Rubus fruticosus*.)

Burn, a rivulet.

Bute or *Boot*, money given in bartering horses, &c. to equalize the value.

Buse, a stall; as cow buse, hay buse.

Buste, a mark set upon sheep with tar, &c.

Byer, a cow house.

C

Carr, flat marshy ground.

Chisel, bran.

Choups, heps, the fruit of briars.

Clag, to adhere or stick together.

Cope, to barter or exchange.

Cope, or *Coup*, to empty or turn out.

Coul, to scrape earth together.

Cow-wa, come away.

Crine, to shrink, pine.

Crying, weeping.

D

Daft, foolish, stupid, insane.

Darking, listening obscurely or unseen.

Dene, a dell or deep valley.

Dight, to dress, to clean.

Doff, to undress.

Don, to dress.

Dowp, a carrion crow.

Draf, brewer's grains.

Drawk, to saturate with water.

Dreerood, a long and weary road.

Dub, a pool.

E

An *Ear* or a *niere*, a kidney.

Ennamters, in case of.

Elsin, an awl.

F

Fell, a moor or common.

Fettle, to make ready.

Flaid, frightened.

Flacker, to flutter or quiver.

Flit, to remove from one dwelling to another.

Fond, silly, foolish.

Forse, a cascade.

Froating, anxious unremitting industry.

Fusin, nourishment.

G

- Gaiting*, a sheaf of corn set up on end to dry.
Gâit for cattle, the going or pasturage of an ox or cow through the summer.
Gait or Gate, a path, a way, a street.
Gar, to oblige to do any thing.
Garsil, hedging wood.
Gear, stock, property, wealth.
Gears, horse trappings.
Gill, a small valley or dell.
Glore, to stare.
Glair, mirey puddle.
Glif, a glance, a fright.
Gob, the mouth.
Gouk, a cuckoo.
Goping, as much as both hands can hold, when joined together.
Grain of a tree, a branch.
Grosers, gooseberries.
Grape, a three-pronged fork for filling rough dung.
Groats, shelled oats.
Greeting, weeping.

H

- Hell or Hail*, to pour.
Haver, oats.

*Haver-meal**, oat-meal.

Hamest†, } the two pieces of crooked wood, which
H'yawms, } go round a horse's neck to draw by.

Haughs, } flat grounds by the sides of rivers.
Holms, }

Hemmel, a shed for cattle, &c.

Heft, a haunt.

Hindberries, raspberries, (*Rubus Ideus*.)

Hipe, to rip or gore with the horns of cattle.

Hogg, a young sheep before it be shorn.

Hopple, to tie the legs together.

Howl, hollow.

Huse, a short cough.

Humbliug Barley, breaking off the awns, with a flail or other instrument.

I

Ings, low wet grounds.

Inkling, an intimation.

K

Káve, to separate with a rake and the foot the short straw from corn.

Kemping, to strive against each other in reaping corn.

Kite, the belly.

* Hence the haversack of soldiers, which was formerly for carrying their oatmeal.

† This is pronounced "*yawms*," with the aspirate H before it. A, in this and many other provincial words is sounded like *yaw*; as *yal*, *ale*; and where so sounded is marked á.

Ken, to know.

Kenspeckled, particularly marked, so as to be easily known.

Keslop, a calf's stomach salted and dried to make rennet.

Kittle, to tickle.

L

Lake, to play.

Late or *Lait*, to seek.

Lemurs, ripe nuts that separate easily from the husk.

Leam, a flame.

Leif, rather.

Letch, a swang, or marshy gutter.

Lib, to castrate.

Lig, to lie.

Lingey, active, strong, and able to bear great fatigue.

Ling, heath (*erica vulgaris*)

Linn, a cascade.

Lop, a flea.

Loach, a leach.

*Lop-loach**, the leach used by surgeons to draw blood.

Lowe, a flame.

* Some of Shakespeare's commentators have been much puzzled to explain the carrier's expression (in *Hen. V.*) that "your chamberlie breeds fleas like a *loach*." A north country reader understands it to mean, that the fleas bite as keen, or suck blood like a leach, loach, or lop-loach.

M

Mang, barley or oats ground with the husk, for dogs and swine meat.

Maugh, a brother-in-law.

Maumy, mellow and juiceless.

Meal of milk, as much as a cow gives at one milking.

Mel-supper, a supper and dance given at harvest home.

Mis-tetch, bad habits.

Mudy-warp, a mole.

N

Neive, the fist.

Neivel, to strike or beat with the fist.

Nolt or *Nnut*, neat cattle.

P

Piggin, a wooden cylindrical porringer, made with staves, and bound with hoops like a pail; holds about a pint.

Plenishing, household furniture.

Prod, a prick.

Pubble, plump, full: usually said of corn or grain when well perfected.

Q

Quickens or *Quicken Grass*, a general name for all creeping or stoloniferous grasses or plants, which give the farmer so much trouble to eradicate.

R

Rated, approaching to rottenness.

Rife, ready, quick to learn.

Rift, to belch ; also to plow out grass land.

Rice, hedging wood.

Rewting, bellowing of an ox.

Rung, a round of a ladder.

Runch, a general name for wild mustard, white mustard, and wild radish.

S

Samcast, two ridges ploughed together.

Sare, much, greatly : as sare hurt, sare pained.

Sheer, to reap or cut.

Sipings, the draining of a vessel after any fluid has been poured out of it,

Snell, sharp, keen : as snell air.

Smash, to crush.

Skelp, to slap, to strike with the open hand.

Skirl, a loud and continued scream or shriek.

Skee, a cylindrical milking pail, with a handle made by one of the staves being a little longer than the rest.

Skugg, to hide.

Soss, to lap like a dog.

Spâit of rain, a great fall of rain.

Spâned, weaned.

Spurling, rut made by a cart wheel.

Stark, stiff, tight, thoroughly.

Steer, a three-years old ox.

Stot, a two years old ox.

Stirk, a yearling ox or heifer.

Steg, a gander.

Stee, a ladder.

Stell, a large open drain.

Stour, dust.

Steek the heck, shut the door.

A *Stint*, in stocking grass land is equal to an ox or cow's grass.

Storkin or *Storken*, to grow stiff: as melted fat cooled again.

Strippings, the last part of a cow's meal, said to be richer than the rest.

Swameish, shy, bashful.

Syde, hanging low down.

Syke, a small brook.

Syles, principal rafters of a house.

T

Tawn, a fishing line made of hair.

Tewing, teasing, disordering, harassing.

Team, to empty a cart, by turning it up, to pour out.

Threave, 24 sheaves of corn, &c.

Titter, rather, sooner.

As tite, as soon.

Trod, a beaten footpath.

Twea, two.

Twibling, slender, weak.

U

Unletes, displacers or destroyers of the farmer's produce.

W

Wankle, uncertain.

Wattles, teat-like excrescences which hang from the cheeks of some swine.

Whang, a leather thong.

Whig, soured whey with aromatic herbs in it, used by labouring people as a cooling beverage.

Win, to get: as winning stones, to get stones in a quarry.

*Wizen*d, dried, shrivelled, shrunk.

Whye or *Quey*, a heifer.

Y

Yak, (*ayk*), oak.

Yal, ale.

Yammer, to cry like a dog in pain.

Yan, (*ane*), ope.

Yance, (*ance*), once.

Yap, ape.

Yarnut, arnut, earthnut.

Yat, gate.

Yaits, (*aits*), oats: hence probably gaitings from yaitings, single sheaves of oats.

*Yau*d, a horse.

Yedders, slender rods that go along the top of a fence, and bind the stakes together.

Yerd, a fox earth.

Yerning, rennet.

Youl, to howl like a dog.

Yuke, to itch.

CONCLUSION.

Means of Improvement.

AMONGST the peculiar characteristics of this county, the minerals are particularly important; both the coal and lead mine districts being much more extensive here than in Northumberland, and from whence the supply of coals for the London market will most probably have to come before the expiration of another century. But that this may be accomplished at an easier expence than the present mode of conveyance, it will be necessary for the legislature to interfere, and pass an act of Parliament, by which way-leave for making canals or waggon-ways, may be obtained through private property, upon similar principles to those by which turnpike roads and canals are at present made: such a law would enable several collieries to send their produce to market, which are now shut out from the navigable rivers, for want of way-leave. In order to make such a measure of more general utility, it may be found necessary to have public rail-ways through different parts of the coal district, upon which the collieries in their vicinity might send their coals to market, upon paying a toll of so much per

ton per mile. Those public rail-ways would also facilitate the carriage of lead, and other productions of the country, and the various species of merchandize wanted for the consumption of the adjoining districts.

One of the greatest improvements to be made in this county, in an agricultural point of view, is the draining of *Morden Carrs*, containing about 3000 acres, which at present are of little value, but if properly drained, would in a few years be worth three pounds an acre: this might be easily accomplished by purchasing Ricknell Mill, of the Bishop of Durham, which, with ten acres of land, is now let for 35*l.* a year: of course the mill cannot be worth more than 15*l.* or 20*l.* a year. This small value is owing to the mill being frequently in back water for three weeks together.

The present mill dam is four feet high, which floats back the water, and prevents it from getting off the carrs. In going down the river, about 200 yards from the dam, at least ten feet of level may be gained, with which the whole carrs might be effectually drained, by making deep and wide ditches, as principal drains, on each side, adjoining the dry lands, and with the soil taken out, making an embankment: smaller cuts, as divisions of property, to communicate with the principal ditches, would drain the intermediate parts, except in such places where springs happened to arise; and these would drain by cuts into the ditches made for the division of property.

But as there is such a number of proprietors, it would be necessary to have an act of Parliament, and commissioners appointed for carrying it into effect: in its pre-

sent state it is a loss to the public, and a disgrace to the proprietors.

In many parts of the county there are considerable improvements still remaining to be made by draining; as many occupiers of farms, as well as proprietors of estates, have not yet availed themselves of this most beneficial of all improvements.

I was surprised to find that no one except Mr Baker, had ever tried saintfoin upon the limestone lands, as it is well known to succeed best upon calcareous soils, and I am inclined to think it would not disappoint the cultivator's expectations here; as it is very probable that the failure of Mr Baker's experiment was owing to the land being of too strong or clayey a nature, which retained the wet, and rotted the roots.

In the old arable lands addicted to wild oats, runch, and other annual weeds, I would recommend the adoption of drilling every species of grain, which would give an opportunity of horse and hand-hoeing every crop, and in a few years totally extirpate those robbers of the soil, and useless consumers of manures, which ought to be applied to the growth of more profitable plants.

If the occupiers of poor clayey soils were to fallow them after being ploughed out from clover or grass, and pursue the system of clover, fallow, wheat, clover and grass, for two years, I am inclined to think they would find it a more advantageous system than that of oats, fallow, wheat, clover, as practised at present.

The haughs from Swalwell to Team, on the river Tyne, are subject to be overflowed at almost every flood, or high tide, which might be prevented by an embankment of no great dimensions. The soil, which is of the

first quality, cannot be let at present for much more than twenty shillings an acre, but if embanked, would readily let for 3*l.* or 4*l.* an acre. This valuable tract of land belongs to a number of proprietors, and of course an act of Parliament for carrying an embankment into effect, would be necessary for apportioning the original expenses, and regulating those that may be afterwards necessary for repairs of banks, sluices, drains, &c. : but until such a material improvement takes place, many parts of these haughs might be applied to more profitable purposes than growing corn, by being planted with osiers, hoop willows, &c. which in the vicinity of such a place as Newcastle, would always find a ready market.

There are also considerable quantities of land towards the Tees Mouth, below those already enclosed at Salt-holm; and upon the Tyne, especially at Jarrow Slake, that are capable of being enclosed by embanking, and rendered much more valuable than they are in their present state.

In a country where there is such a demand for wood for the collieries and lead-mines, considerable improvements might be made by planting. A great many bank sides, and other unproductive places of the limestone districts in the eastern parts of the county, might be planted to considerable profit. I observed at Ellemore, larches growing very luxuriantly upon lands of this description, totally unfit for cultivation, and of little value for any other purpose.

This will also apply to numberless other places, especially upon, and adjoining the moors, in the western parts of the county; but the tenures of copyhold and leasehold, under the church, are insuperable bars to im-

provement by planting : upon all lands under those predicaments there can be no hopes of the owners planting upon them, unless a law be made to give them the full property of every tree they plant, and exonerating them from any controul or interference of the dignitaries of the church.

The projected canal from Stockton to Staindrop, with a branch to the coal-mines, would be of the utmost utility ; but I am afraid there is not public spirit enough to carry such a beneficial measure into effect. The principle upon which Mr Dixon proposed to carry the canal through the collieries without a lock, might be applied in various other places with the greatest advantage, and will most probably be adopted at some future period, for the conveyance of coals through the western parts of the coal district to some public rail-way ; to be conveyed to the navigable rivers of Wear, Tyne, and Tees.

There is a particularly favourable situation for a canal of this kind, by taking the deep dene a little to the east of Ferry Hill, (called Thristleden Dene) as the highest point, and proceeding westward upon a level : it is probable the line would cross the Gaunless Brook about West Auckland, and go down the other side by Wood House Close, and from thence to Railey Fell, Witton Park, and other collieries to the westward. Nearly the whole of this line would pass through a coal district, and take in all the principal collieries, by having short rail-ways from them to the canal.

This western part being executed, a conveyance from the first fixed point in Thristleden Dene would be easily obtained by two or three locks into Morden Carrs, through which a level line might be taken to the Turnpike road

near Sedgefield, and another to near Rickneld Mill, and from thence by a few locks to Darlington, by which the south and eastern parts of this county, and the northern parts of Yorkshire, would have their coals and lime at a much less price than they have at present ; and the same consequences would be felt by the western parts of the county, in respect to lime, timber, and various other articles conveyed to the westward.

Great improvements might be made in most of the public roads, but so long as they are conducted in the mode they have hitherto been, it would be useless to say any thing on the subject. I shall therefore proceed to add some additional information by way of appendix.

APPENDIX.

Minerals.

IN the section on minerals, it was stated that a dark blue marble was gotten near Frosterley, in Weardale. I have now to add, that in the course of last year, Mr Goodchild has discovered in his limestone quarry at Pallion, several strata of marble, coloured or clouded with all the varieties of brown tints from a dark brown to a cream colour. It bears a fine polish, and Mr Goodchild informs me will stand any weather, will not fly with heat, and is hard enough for any purpose, having been tried by several marble cutters and statuaries in London.

There are four beds that afford the marble, which are each three or four inches thick: they lie near the bottom of the quarry, about eleven fathoms from the surface, and have been hitherto burned into lime.

Wheat.

Under the article *turnips*, page 161, an experiment

between broad-cast and drilled turnips, is related, to which should have been added; that in the beginning of March, the ridge which had grown broad-cast turnips, was sown with red wheat, at the rate of $2\frac{1}{2}$ bushels per acre, drilled at $10\frac{1}{2}$ inches intervals; and the adjoining ridge, upon which the turnips had been raised in the row culture, was also sown with an equal quantity of the same seed, at the same distance of intervals, and with the same machine. The wheat on the latter ridge was $2\frac{1}{2}$ bushels per acre more than that on the former: the produce of straw was also superior by about 15 cwt. per acre.

The turnips were all taken off; and as those upon the drilled ridge were superior in weight in the ratio of 4 to 3, there can be little doubt, but the succeeding crop of wheat upon it, would have been still more productive, if the turnips had been eaten upon it by sheep.

Carrots.

In 1809, Mr Mason, upon a sandy soil at Chilton, that had grown a crop of oats the preceding year, had a crop of carrots (without any manure) drilled at 18 inches distance with the single-row drill (fig. 3. plate ii,) the seed being mixed with sand to make it separate: the produce ten tons per acre.

Cattle.

At page 233, a four years old heifer of Mr Robert Colling's is mentioned, as a perfect counter part of his

brother Charles's ox : she is by the same sire, at present six years old, and I am informed by some good judges who have lately seen her, that she surpasses the ox for fatness at the same age, and taking her altogether, much more covered than any animal ever shewn in the county. I have been favoured with her dimensions, by which it appears, that in point of size she is not large, her height being only 4 feet 9 inches.

Dimensions of Mr Robert Colling's white heifer :

			<i>Ft. Ins.</i>
Length from horns to tail	-	-	7 5½
Height at crops	-	-	4 8½
at the hips	-	-	4 9½
From breast to ground	-	-	1 5
Girth at crops	-	-	8 9
belly	-	-	9 10½
loins	-	-	9 7
Breadth at hips	-	-	2 7¼
at shoulder	-	-	2 6½
at the hind rib	-	-	3 1

Weights.

The weight used in this county is avoirdupoise : the only deviations from it are, that a stone of wool is 18 lbs. and a pound of butter varies in different places. At Stockton it is 24 ounces ; at Sunderland, Darlington, Barnardcastle, &c. 22 ; and at Stanhope, 21 ounces,

Implements.

In the section on ploughs, it was intimated that some directions would be given to enable carpenters to construct ploughs upon certain and true principles, to plough at any depth required.

When a plough is properly made, it should go perfectly level upon its sole, without having any tendency to go shallower or deeper than what is intended.

In order to obtain this, the point of draught at the horse's shoulder, the point of yoking at the cop or beam end, and a point on the coulter, at half the depth the land is intended to be ploughed, should be all in one right line*. On this principle is founded the following

* Some of my readers may wish to have a proof of this. I therefore subjoin the demonstration of the following proposition :

If a bended lever CBI), moving on the fulcrum C, be acted upon by a power at the end D, in direction DP, to find the direction of DP, so that D may remain in equilibrio, or BD parallel to TC. (Fig. 1st, plate vi.)

The power acting in the direction of DP, will be represented by DP, which, by the resolution of forces is resolved into PQ and DQ; PQ being that part of the absolute force that tends to raise the end D; and DQ that part which tends to turn the lever round C, and lower the end D, which by the property of the lever, is known to be as CA.

Therefore the force to raise the end D being PQ, and the force to lower the end D being CA, it can only be in equilibrio, when these two forces are equal.

To find this; produce PD to meet CA at E; then the triangles DPQ and DAE being similar, the absolute force DP will be represented by ED, and the force PQ tending to raise the end D by AE; but that AE may be equal to AC, the point E must descend to A, and the line EDP revolve round D to the position CDp: in which case the point of draught p, the point of yoking D, and the point of resistance C, are all in one right line.

Practical Construction, for determining the Position of the most essential Parts of a Plough.

That the operation of ploughing may be performed with the least loss of power, it is necessary to know the height and inclination of the horse's shoulder. The medium height of the point of draught on the shoulder of a horse $15\frac{1}{2}$ hands high, is 48 inches; and when a horse is in the act of pulling, the inclination of his shoulder varies from 69 to 75 degrees: the medium is 72 degrees. These data being got from experiment, and the depth to be ploughed (suppose 6 inches) given,

Draw a right line AL, and at any point A, erect a perpendicular AP equal to 48 inches. (Fig. 2, plate vi.)

Make the angle $\angle APB = 72$ degrees, and produce the line bounding this angle to meet AL at B.

Set the length of the traces and swing-trees from P to H: this varies from 98 to 106 inches—the medium is 102.

From H let fall a perpendicular HI, which measured upon the scale that AP was taken from, will give the height of the beam $= 16\frac{1}{2}$ inches.

Then at the distance of half the depth the land is intended to be ploughed, draw a line parallel to AB, and from C, where it intersects BP, let fall a perpendicular upon AB, which will give the point of the sock at S; and a line drawn through C, making an angle of 45 degrees with BA, will be the position of the fore-edge of the coulter.

The heel of the plough will be gotten by setting the length of the sole 36 inches from S to L.

The length of the beam may be determined by erecting a perpendicular at L, which will give the length from M to H (78 inches) to which must be added the length of the end tenoned into the landside stilt, which will vary from 6 to 8 inches, according to the curve of the beam, making the whole length about 7 feet.

From the above construction the following *mechanical method* of proportioning the length and height of plough beams is obtained, and which, I hope, no carpenter can find any difficulty in using.

Upon a piece of deal LI, $77\frac{1}{2}$ inches long (fig. 3, plate vi,) 3 inches broad, and $1\frac{1}{2}$ inches thick, at I fix a piece of wood 2 inches broad, and make IH= $16\frac{1}{2}$ inches, and set off from L to S 36 inches; at S erect a perpendicular equal to 3 inches; then fix another piece BC (3 inches broad) so that its upper edge BH shall pass through these two points S and H, to intersect the line LI at B $26\frac{1}{2}$ inches from L; upon the perpendicular at S, set off 1 and 2 inches, and through these points draw lines from 2 to 2, and from 1 to 1 parallel to BH.

With this instrument the length and height of beams may be easily found to plough any depth required.

Suppose the depth wanted to be ploughed is 6 inches, apply LI to the sole of the plough, and where the line 3,—3, intersects the line MH (drawn parallel to LS along the middle of the side of the beam) is the point of yoking, and MH= $77\frac{1}{2}$ inches.

If it were required to have a plough to go 4 inches deep, apply the instrument as before; and where the

line 2,—2, intersects MH at o, gives the point of yoking, and Mo=80 inches.

If the depth had been 2 inches, then the intersection of the lines MH and 1,—1 at p, will be the point of yoking, and Mp=83 inches.

To plough 8 inches deep, set $4\frac{1}{2}$ inches upon the perpendicular from S, and through the point of $4\frac{1}{2}$ inches draw a line parallel to B3 to intersect MH, which will give the point of yoking distant from M=74 $\frac{1}{2}$ inches.

If the length of the beam was limited, suppose to 6 feet, to find the height to plough $4\frac{1}{2}$ inches deep.

Here allowing 6 inches for the end and tenon MT, set off 66 inches from L to n; at n erect a perpendicular, and where it intersects the line 2,—2, at e, gives the height of the beam equal to 12 inches. If the depth to be ploughed had been six inches, then the intersection with the line 3,—3 would be the height=13 $\frac{1}{2}$ inches.*

If the height of the beam was required to be 12 inches, and depth ploughed 2 inches.

Upon IH, set from I to r, 12 inches, and through the point draw a line parallel to LI; where it intersects the line 1,—1, at v, will be the point of yoking, and the length of the beam 62 inches.

Having thus determined the mode of finding the lengths and heights of beams, the next thing is to find the form of the mould board, and curve of the breast.

* Whenever the height of the beam is less than 16 $\frac{1}{2}$ inches, the traces will have to be lengthened, to preserve the line of draught perpendicular to the horses shoulders.

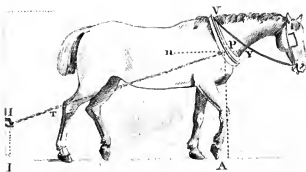


Fig. 9.

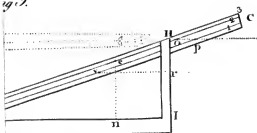
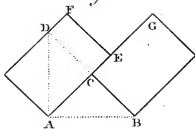
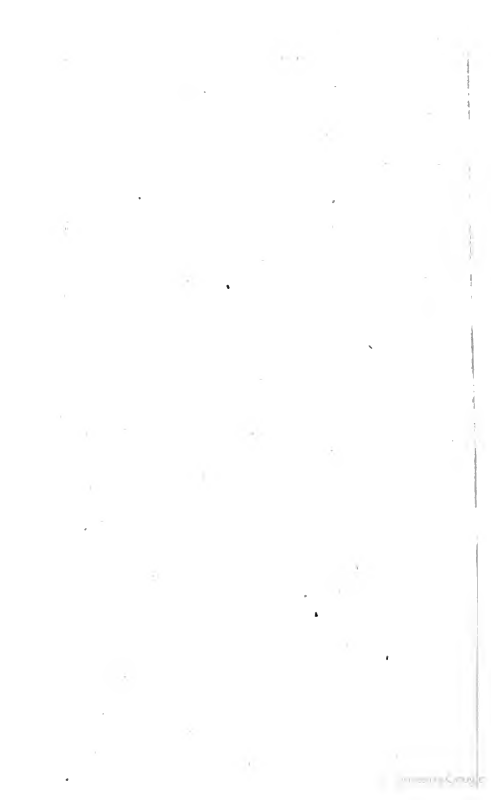


Fig. 5.



Fig. 6.





When I first endeavoured to investigate the best form of a mould board, I began with trying to find the form of an inclined plane, which would raise any sod from an horizontal position at A, to a perpendicular one at H, (fig. 5, plate vi) but it soon appeared that though this might be done for a small slice or section, yet it would not do for the whole sod, of old sward, which being bound together at the surface by fibrous roots of different textures, they created an elasticity that affected the whole, from the sock point to the hind end of the mould board; and that if a sod of this kind was turned over, as if left by the plough, viz: in a horizontal position at A (fig. 4, plate vi,) and at an angle of 45 degrees* at T, the inner

* The criteria of good ploughing are generally admitted to be, that the sod is a right angled parallelogram cut clean, and laid in such a position, that the greatest quantity of surface be exposed to the atmosphere, which is, when the sod is laid at an angle of 45 degrees, as will appear by the following investigation: (Fig. 6, plate vi.)

Suppose AEF and BCG, to be two furrow sods of equal dimensions.

Then because $AC + CE = CE + EG$.

By deducting CE, we have $AC = EG$

And by the data $CB = EF$.

Hence $AC + CB = EG + EF$, the surface exposed, which is required to be a maximum.

Produce BC, and make $CD = AC$, and draw AD.

Then $BD = BC + (CD)AC$ the surface exposed.

The angle DCA being a right angle, and $DC = AC$, the angles D and DAC will be each equal to half a right angle.

Then the sine D : AB :: sine DAB : DB.

But the angle D and base AB being both constant, DB will be the greatest when the sine of the angle DAB is the greatest, which is well known to be such when a right angle.

And as the angle DAC is half a right angle, therefore

If from the right angle DAB

There be taken the half right angle DAC,

There will remain CAD, equal to half a right angle, or 45 degrees, the position of AE.

edge AT would form a curve, which the mould board ought to fit, so as to be pressed equally alike from one end to the other.

In order to obtain this curve, I had several sods cut (of different textures) 9 inches broad and 6 inches deep, and put into this position; and measuring at equi-distant places the perpendicular heights raised, and the horizontal distances removed from the original position, the average result was, as in the following table.

<i>From A to C. Inches.</i>	<i>Perpendi- culars. Inches.</i>	<i>Horizon- tals. Inches.</i>	<i>From A to C. Inches.</i>	<i>Perpendi- culars. Inches.</i>	<i>Horizon- tals. Inches.</i>
3	0.1		30	8.1	5.0
6	0.3		33	8.77	6.9
9	0.6		36	9.5	9.0
12	1.3	0.1	39	10.2	11.0
15	2.1	0.27	42	10.6	12.8
18	3.2	0.58	45	10.8	14.4
21	4.35	1.1	48	10.8	15.8
24	5.65	2.0	51	10.5	17.0
27	6.95	3.25	54	10.2	18.0

From the above data, we have the following

Construction for the Mould-Board.

Draw a right line AC (fig. 1, plate vii,) upon which set from A to C, the number of equi-distant parts of three inches each, in column first of the above table, and mark them 3, 6, 9, 12, 15, &c.

Through each of these equi-distant points, draw lines at right angles to AC.

Upon these perpendiculars on the upper side of AC, set the distances in column second of the table, viz. :

At 3 inches	0.1
6	0.3
9	0.6
12	1.3, &c.

And through the different points draw the line CDE, which is the form of the curve, that the inner corner of the sod describes in its perpendicular ascent, or the form of the perpendicular inclined planes, that assist in raising the sod from a horizontal to a perpendicular position.*

Upon the perpendiculars on the underside of the line AC, set the distances in column thjrd, viz :

* The form of the inclined plane by which the sod is raised, is represented upon the mould-board, by the dotted line CDE; and as the power necessary to raise any given weight upon an inclined plane, is as the height of the plane to its length, this principle affords a means of judging of the comparative merits of mould-boards. For instance, suppose the form of the mould-board to be such, that a part of the sod is raised 4 inches in perpendicular height, at 15 inches from the sock point; this being compared with the table, it will be found that at the same distance of 15 inches, the perpendicular height was only 2.1, and of course the power required in the first case, would be nearly double to that in the latter.

At 12 inches	0.1
15	0.27
18	1.1
24	2.0, &c.

And through the several points draw the line CFG, which will be the form of the curve that the sod describes in a horizontal position, or the form of the horizontal inclined planes, that assist in turning the sod over.

The sod being perpendicular at F, and also the mould-board, the point D will be at the same distance from the land side of the plough as the width of the sole BF.

Therefore a line drawn from F to *b*, will, with BF and B*b*, represent a section of the plough through Db.

And a line drawn from F through *c*, to meet the line AC in *d*, will with BF and B*d* represent a section of the plough through cd parallel to the horizon at 8.77 inches high.

And a line from F through *e*, to meet AC in *f*, gives the triangle BF*f*, which represents a section of the body of the plough through ef, parallel to the horizon at 8.1 inches high.

And lines from F through *g, i, l, n, p, r, t, &c.* to intersect AC in *h, k, m, o, q, s, u, &c.* will form triangles representing sections of the body of the plough, through gh, ik, lm, no, pq, rs, tu, and vw, respectively.

Then make db=B*b*
 cd=B*d*
 ef=B*f*
 gh=B*h*
 ik=B*k*

$lm=Bm$
 $no=Bo$
 $pq=Bq$
 $rs=Br$
 $tu=Bu$
 $vw=Bw$

And through the points C, w, u, s, q, o, m, k, h, f, d, and b, draw the curve cmb, which will be the true form of the breast of the plough.

The form of this curve may be gotten for practical purposes, by erecting perpendiculars on BC, at convenient distances, and their heights being measured, are as in the following table :

<i>Distance from C. Inches.</i>	<i>Height of perpendicu- lars. Inches.</i>	<i>Distance from C. Inches.</i>	<i>Height of perpendicu- lars. Inches.</i>	<i>Distance from C. Inches.</i>	<i>Height of perpendicu- lars. Inches.</i>
3	0.10	16	2.70	22	7.15
6	0.32	17	3.12	23	8.55
9	0.73	18	3.72	24	10.10
12	1.36	19	4.30	25	12.00
14	1.98	20	5.05	26	14.50
15	2.30	21	6.00		

From the above investigation is derived

A practical Method of making the Mould Beard.

Let the curve of the breast be drawn or laid down on

the land side of the plough, either from the above table, or by a model or pattern constructed from it.*

The mould-board being cut perpendicular to the horizon at BD, draw a right line BD, (perpendicular to the sole BC) upon which, from B towards D,

Set the distances 2.1 to p

4.35 to l

6.95 to g

And 9.5 to D

And mark upon the curve of the breast, where perpendicular to AC, of equal lengths to the above: intersect it as at q, m, h, b.†

Then cut the mould-board in *right lines* between those given points, viz: along pq, lm, gh, and Db, all parallel to the horizon, which are the same as the lines Fq, Fm, Fh, and Fb.

The intermediate parts wrought into right lines, in the same manner, and parallel to the horizon, will give the mould-board such a form, that the point S, (fig. 2,) of the sod, will ascend along the line CD (fig. 1) from a horizontal position at C, to a perpendicular one at D.

For the Hind Part BDE.

Let a piece of deal 1.3 inches thick, be cut into the

* It is much the best to have a pattern made of slit deal, which will be ready on all occasions.

† This may be easily done by setting the above distances upon a perpendicular to the sole AC on the *land side*; and through the different points lines drawn parallel to the sole AC, will intersect the breast in the points wanted.

form bFG , on the inner surface or plane, and to the form DE , on its upper surface or plane; then apply this model to the line Db , on the mould-board, viz: its inner surface Fb to Db , and cut the part of the mould-board DE , to fit exactly the upper edge or junction of the two planes of the model which represents the inner corner of the furrow sod from F to G , when laid at an angle of 45 degrees at G .

Then let the plough be placed upon a horizontal plane, on which fix a lath or straight edged piece of wood, (to represent the land side of the furrow) against which the plough can be easily moved backwards and forwards; and at F (9 inches from the lath) place a board POV , 9 inches high by 6 broad, to turn upon a hinge at the corner V , (fig. 2, pl. vii) then the lower part of the mould-board BQE (fig. 1) must be cut away in such a manner, that when the plough is drawn along the lath U (fig. 2) the point S shall be the only part of the board STV , that the mould-board mb or MB touches: the tract of the point S being along the line DE (fig. 1) marked out before by the model made from the line GFb , as described above.

The part DB (fig. 1) will next want correcting, which, instead of being perpendicular (as at first was necessary) must be cut away at B at least $\frac{1}{2}$ or $\frac{3}{4}$ of an inch inwards, and so as to terminate or die out nearly in a line from D to b : the reason of this will appear by considering that when the sod arrives at BD , it is in a perpendicular position, and is to be turned over with the least force, by the mould-board acting at the points P or S (fig. 2); but if the mould-board be perpendicular at BD (fig. 2) when the sod arrives at that position, the two surfaces will coincide, and

the point O (fig. 2) being equally pressed as the point P, the sod cannot turn on the corner V. This inconvenience will be prevented by cutting the mould-board at BD, (fig. 1) into the position Pb (fig. 2) where POV is a section of the sod; mb, the mould-board; POB, the part to be cut away; and Ob, $\frac{1}{2}$ or $\frac{3}{4}$ of an inch, as above stated.

It has been an universal complaint against ploughs, that they wore away more and sooner at B, (fig. 1) than any other place, which is owing to the great friction of this part against the bottom of the sod, in preventing the point O from rising. This being attended with such inconveniences, and of little use in other respects, it is better removed, by cutting the end in such a manner, that it may be about two inches from the plane of the sole at the point B (fig. 1) and cut for 10 or 12 inches towards C, viz: from P to b, with the same inclination as Pb, (fig. 2) by which it will appear by inspection of fig. 2, that every obstruction to the rising of the point O, will be removed; and also the extra wearing of the mould-board at the bottom b, or B.

The tract of the point O of the sod, in rising from its perpendicular position at BF (fig. 1) to where it is left at an angle of 45 degrees, is nearly in a line from B to L. A mould-board made to coincide with this tract, could only be useful in plowing sands or very fine fal-lows: in almost every other situation it would be detrimental. The line BQE has been found the most generally useful; but this may be made more or less convex, to suit particular purposes, soils, and situations.*

* For this purpose a piece of sheet-iron is fixed on the inside of the mould board, moving on a bolt near E, and let down to any position by a screw near B.

When these corrections are made, the mould-board will be so formed, that the sod will pass along it without pressing upon any other part than the point S, (fig. 2) which being the extremity of the bended lever STV, the sod will be turned with less force, acting at that point than any other intermediate one between T and S.

The form of the top EMN, is of little consequence, and may be altered to any other that may be thought more convenient.

It may be necessary to remark, that the surface of the mould-board thus obtained, *if made of wood*, and intended to be covered with plate iron, must be sunk or cut away one-eighth of an inch (the thickness of the iron) in order that the form may not be altered. But mould-boards of *cast iron*, *from a model made on the above principles*, are much more preferable, not only on account of the greater certainty of the form, but also in respect to cheapness.*

Some persons imagine that the position of the sod depends on the form of the mould-board: I shall therefore add a few problems, to shew that the position depends on the proportion between the breadth and depth of the furrow, and not on the form of the mould-board.

* These, and also maundrels for making the socks upon, may be had of Messrs Whinfield, iron-founders, Newcastle, and of Messrs Robertson and Co. Berwick.

PROBLEM I.

Having given the breadth of the furrow (9 inches) and depth 7 inches, to find the angle of position. (Fig. 3, p. vii.)

Describe a semi-circle on the breadth AB, and with the depth intersect the semi-circle in C: through AC draw AD, and measure the angle : DAB gives the angle of position 51 degrees 3 minutes.

By Calculation.

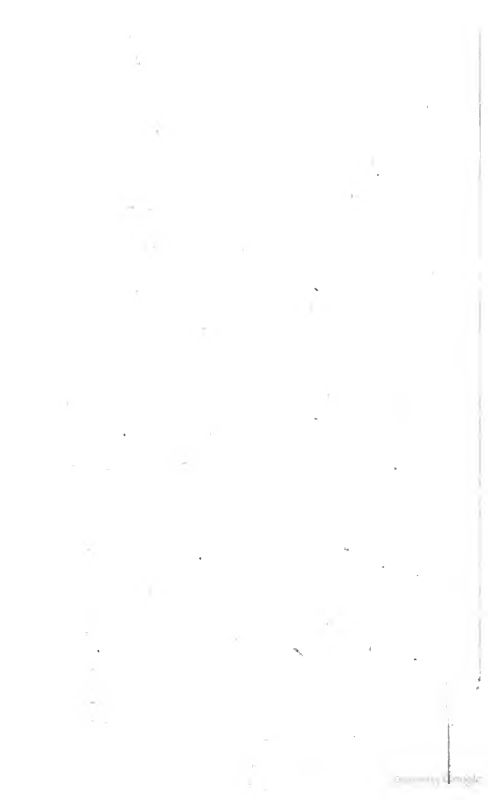
As AB : rad. : : CB : sine of CAB.

The two first terms of this proportion being constant, the angle of position will depend on the depth CB. If it be taken equal to the breadth, the angle CAB becomes equal to radius, or a right angle, and the position of the sod will be upright. If CB be taken very small, the position of the sod becomes nearly horizontal. If the depth be one inch, the angle of position will be only 6 degrees 22 minutes.

PROBLEM II.

Given the angle of position (30 degrees) and breadth 9 inches to find the depth. (Fig. 4, plate 7.)

Describe a semi-circle on AB, the breadth (9 inches,) make the angle DAB equal to the angle of position (30 degrees) and from where the line forming this angle cuts the semi-circle at C, draw a line to B for the depth, which



measured on the same scale that AB was taken from, gives the depth CB $4\frac{1}{2}$ inches.

By Calculation.

$$\text{As rad. : AB :: sine CAB : CB.}$$

The two first terms being constant, if the sine of CAB become equal to radius, (or a right angle) CB will then become equal to AB.

PROBLEM III.

Having given the depth to be ploughed, $6\frac{1}{4}$ inches, and the angle of position in which the sod is to be laid (44 degrees) to find the breadth of the furrow. (Fig. 5, plate 7.)

Draw an indefinite line LI, and at any point, as B, make an angle LBN, equal to the complement of the angle of position (46 degrees); upon BN set off the depth from B to C ($6\frac{1}{4}$ inches) and at C erect a perpendicular, where it intersects LB, gives the breadth of the furrow AB (9 inches.)

By Calculation.

$$\text{Sine } \angle A : BC :: \text{rad. : AB.}$$

The third term being constant, the breadth will depend on the ratio between A and BC, and when A is constant, or the angle of position the same, the breadth will depend entirely on the depth.

From hence it appears that the position of the sod depends entirely on the judgment of the ploughman, in properly proportioning the breadth and depth of the furrow.

Position of the Beam.

It is very common with plough-wrights to place the beams CV (fig. 7, plate vi,) in a different plane from the land-side GC of the plough, in order, as they term it, "to give the plough land." If a plough was to be always drawn by horses yoked one before another, and going in the furrow, this position would be right, if it was not attended with the inconvenience of taking the coulter-hole considerably to one side of the point of the sock, and of giving the coulter an inclining position towards the land; but where horses are yoked double, the position of the beam should be in the same plane with the land-side of the plough*, which not only gives the coulter a perpendicular position, but is equally useful for horses yoked single, and going in the furrow LM, by having an iron cop (fig. 8, plate vi,) at the end of the beam, with holes in it on the furrow side, by which the breadth of the furrow can be easily regulated.

That the coulter may have a perpendicular position, and cut in the same plane as the land-side of the plough, it should be so placed, that a right line, or straight ruler, laid along the land-side of the plough, (after being plated) should pass exactly along the middle of the back of the coulter; on this account the middle of the coulter-hole in the beam should not be cut in the same right line with the land-side of the plough (before plating) but so much nearer the land, as the thickness of the plating of iron is intended to be, which is generally one-eighth of an inch.

* For the demonstration of this, as well as many other particulars, I beg to refer to my Essay on the Construction of the Plough, which may be had of Sir R. Phillips, London, Mr Constable, Edinburgh, and Mr John Bell, Newcastle.

THE END.

NEWCASTLE UPON TYNE: PRINTED BY EDWARD WALKER.

SUPPLEMENT.

THE publication having been deferred a few months, has given me an opportunity of inserting an account of Mr Charles Colling's sale of live stock,—of correcting an inadvertent mistake,—and of supplying some omissions.

At page 229, it is stated that Mr Charles Colling had “refused 500 guineas for a cow.” This might be thought the whim of an individual; but the following account of the sale of his stock, the 11th of October, 1810, will shew the public opinion of the value of this breed of cattle, and the very high estimation in which they are held by the best judges, in this, and various other counties.

A Catalogue of Mr C. Colling's sale of improved short-horned cattle.

COWS.

<i>Names.</i>	<i>Out of</i>	<i>Got by</i>	<i>Age</i>	<i>Bull'd by</i>	<i>Sold for</i>	<i>Bought by</i>
<i>Cherry</i>	Old Cherry	Favourite	<i>Yrs.</i> 11	Comet	<i>Gr.</i> 83	J.D.Nesham, Esq. Houghton-le-Spring, Durham.
<i>Kate</i>		Comet	4	Mayduke	35	Mr Hunt, Morton, Durham.
<i>Peerss</i>	Cherry	Favourite	5	Comet	170	Major Rudd, Marton, Yorkshire.
<i>Countess</i>	Lady	Cupid	2	Ditto	400	Ditto
<i>Gelina</i>	Countess	Favourite	5	Petrarch	200	Sir H. Ibbetson, Bart. Denton-Park, Yorkshire.
<i>Johanna</i>	Johanna	Ditto	4	Ditto	120	H. Witham, Esq. Cliff-Hall, Yorkshire.
<i>Lady</i>	Old Phoenix	a grandson of Lord Bolingbroke	14	Comet	206	C. Wright, Esq. Cleasby, Yorkshire.
<i>Laura</i>	Lady	Favourite	4	Ditto	210	Mr Grant, Wyham, Lincolnshire.
<i>Cathelene</i>	a daughter of the dam of Phoenix	Washington	8	Ditto	150	G. Parker, Esq. near Malton, Yorkshire.
<i>Lilly</i>	Daisy	Comet	3	Mayduke	410	Major Rudd, Marton, Yorkshire.
<i>Daisy</i>	Old Daisy	a grandson of Favourite	6	Comet	140	R. Bower, Esq. Welburn, near Malton, Yorkshire.
<i>Gera</i>	Countess	Favourite	4	Petrarch	70	G. Johnson, Esq. near Scarbro', Yorkshire.
<i>Beauty</i>	Miss Washington	Marsk	4	Comet	120	Mr Wright, Cleasby, Yorkshire.
<i>Red-Rose</i>	Eliza	Comet	4	Mayduke	45	W.C.Fenton, Esq. near Doncaster.
<i>Flora</i>		Ditto	3	Ditto	20	Earl of Lonsdale.
<i>Miss Piggy</i>		a son of Favourite	3	Comet	60	O. Gascoigne, Esq. Parlington, Yorkshire.
<i>Margdalene</i>	a heifer by Washington	Comet	3	Ditto	170	Champion, Esq. Blyth, Nottinghamshire.

BULLS.

<i>Names.</i>	<i>Age</i>	<i>Out of</i>	<i>Got by</i>	<i>Sold for</i>	<i>Bought by</i>
	<i>Yrs.</i>			<i>Gs.</i>	
<i>Comet</i>	6	Phoenix	Favourite	1000	Messrs. Wetherill, Trotter, Wright, and Charge, near Darlington.
<i>Yarborough</i>	2		Ditto	55	A. Gregson, Esq. Lowlin, Northumberland.
<i>Major</i>	3	Lady	Comet	200	— Grant, Esq. Wyham, Lincolnshire.
<i>Mayhuk</i>	3	Cherry	Ditto	145	— Smithson, Esq.
<i>Petrarch</i>	2	Old Venus	Ditto	365	Major Rudd, Marston, Yorkshire.
<i>Northumberland</i>	2		Favourite	80	Mr Buston, Coatham, Durham.
<i>Alfred</i>	1	Venus	Comet	110	Mr Robinson, Acklam, Yorkshire.
<i>Duke</i>	1	Duchess	Ditto	105	A. Compton, Esq. Carham, Northumberland.
<i>Alexander</i>	1	Cora	Ditto	63	W. C. Fenton, Esq. near Doncaster.
<i>Ossian</i>	1	Magdalene	Favourite	76	Earl of Lonsdale.
<i>Harold</i>	1	Red Rose	Windsor	50	Sir C. Loraine, Bart. Northumberland.
				2249	

BULL CALVES UNDER ONE YEAR OLD.

<i>Ketton</i>	Cherry	Comet	50	R. Bower, Esq. Welburn, Yorksh.
<i>Young Favourite</i>	Countess	Ditto	140	— Skipworth, Esq. Lincolnshire.
<i>George</i>	Lady	Ditto	130	— Walker, Esq. Rotherham, Yorksh.
<i>Sir Dimple</i>	Daisy	Ditto	90	T. Lax, Esq. Ravensworth, Yorksh.
<i>Narcissus</i>	Flora	Ditto	15	C. Wright, Esq. Cleasby, Yorksh.
<i>Albion</i>	Beauty	Ditto	60	T. Booth, Esq. near Catterick, Yorksh.
<i>Cecil</i>	Peeress	Ditto	170	H. Strickland, Esq. Boynton, Yorksh.
				657

HEIFERS.

<i>Names.</i>	<i>Age.</i>	<i>Out of</i>	<i>Got by</i>	<i>Sold for</i>	<i>Bought by</i>
<i>Phoebe</i>	3	Dam by Fa-	Comet	<i>Gs.</i> 105	Sir H. Ibbetson, Bt. Denton Park.
<i>Young Duchess</i>	2	Ditto	Ditto	183	T. Bates, Esq. Hal- ton Castle, North- umberland.
<i>Young Laura</i>	2	Laura	Ditto	101	Earl of Lonsdale.
<i>Young Countess</i>	2	Countess	Ditto	206	Sir H. Ibbetson, Bt.
<i>Lucy</i>	2	Dam by Wash- ington.	Ditto	132	C. Wright, Esq. Cleasby.
<i>Charlotte</i>	1	Cathelene	Ditto	136	R. Colling, Esq. Barmpton.
<i>Johanna</i>	1	Johanna	Ditto	35	G. Johnson, Esq. near Scarbrough, Yorkshire.
				898	

HEIFER CALVES UNDER A YEAR OLD.

<i>Lucilla</i>	Laura	Comet	106	— Grant, Esq. Wy- ham, Lincolnshire.
<i>Calista</i>	Cora	Ditto	50	Sir H. V. Tempest, Bart. Winyard, Durham.
<i>White Rose</i>	Lilly	Yarbro	75	H. Strickland, Esq. Boynnton, York- shire.
<i>Ruby</i>	Red Rose	Ditto	50	R. Bower, Esq. Welburn, York- shire.
<i>Cowslip</i>		Comet	25	Earl of Lonsdale,
				306

From the above, it appears that—

	<i>£.</i>	<i>s.</i>	<i>d.</i>
17 Cows were sold for	2802	9	0
11 Bulls - - -	2361	9	0
7 Bull Calves - -	687	15	0
7 Heifers - - -	942	18	0
5 Heifer Calves - -	321	6	0
In all 47 were sold for	7115	17	0

In relating the experiments of the weight of butter obtained from a quart of milk, I have stated (page 238) that Mrs Watson's and Mr Bates's cows were of the "great milking tribe." This Mr Bates informs me is a mistake, "as his short-horned cows were both those he bought of Mr Robert Colling and Mr Chas. Colling, as well as the cows and heifers descended from their bulls, and likewise the old breeds of the neighbourhood, in his own possession, and that of his father, and that the result of his experiments was the average of his whole dairy, through the summer months*, while the cows were at grass; but that Mr Walton's experiments were made when the cows were fed with hay, and soon after calving;†" under which circumstances, he says, "that a greater quantity of butter is obtained from a given

* Some of the kyloe cows gave 2½ ozs. of butter; but the average of the whole was 2 ozs. per quart: there was also similar variations with individuals of the short-horned breed; but the average was 1 oz. per quart.

† They were not *all* new calved, but had calved in the course of the winter. *Mr Walton.*

" quantity of milk, than when the cows are fed on grass; and of course no proper comparison can be drawn between his and Mr Walton's experiments:" Upon this subject Mr Bates says he has made several experiments, which he will furnish the Board of Agriculture with, if they desire it.

Mr Robert Colling informs me that since he made his trials on crossing, (related page 238) he has seen better kyloe cows than those he experimented with; but he has never seen any kyloe cows so good (in his opinion) as the best short horns: and if the doctrine holds good, that "*like produces like*," he is inclined to think, that no improvement is likely to be made in the improved short horns, by crossing them with kyloes.

PROVINCIAL TERMS,

Obtained since the former collection.

B

Bigg, four rowed barley.

C

Cain or *Comb*, remains of an earthen mound.

F

Fog, aftermath.

G

Gavelock, an iron lever.

Gimmer, an ewe sheep, from the first to the second shearing.

H

Hard Corn, wheat and maslin.

Howk, to make a hole, or cut earth with a spade.

K

Kevel, a large hammer for quarrying stones.

Kemps, hairs amongst wool.

L

Liek, to beat, to chastise.

Looking Corn, weeding corn.

Lyery, abounding with lean flesh, especially on the buttocks.

R

Reins, balks of grass land in arable fields.

S

Scaling, spreading mole hills or dung.

Scallions, young onions.

Seives or *Sparts*, articulated rush.

Shive, a slice of bread, &c.

Sills, strata of minerals.

Slope, slippery.

Slocken, to quench thirst.

Swarth, sward, the surface of grass land.

Swathe, a row of mown grass, as left by the scythe.

T

Thud, a heavy stroke.

W

Ware-corn, barley or oats.

The words used by carters to draft horses, are :

Heck, or *Hop*, come here, or turn to the left.

Gee, or *Ree*, go off, or turn to the right.

Wo, stop, or stand still.

The reader is desired to correct with his pen, the following

ERRATA.

PAGE	LINE	
30,	9	<i>For north-west, read south-west.</i>
74,	23	<i>For two-chain, read tow-chain.</i>
79,	19	<i>For fig. 3, read fig. 5th.</i>
114,	6	<i>For 3, read 6.</i>
254,	1	<i>For day, read week.</i>
339,	30	<i>For A, read C.</i>
393,	36	<i>For CAD, read CAB.</i>
399,	31	<i>For fig. 2nd, read fig. 1st.</i>
400,	23	<i>For BF, read B or F.</i>



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